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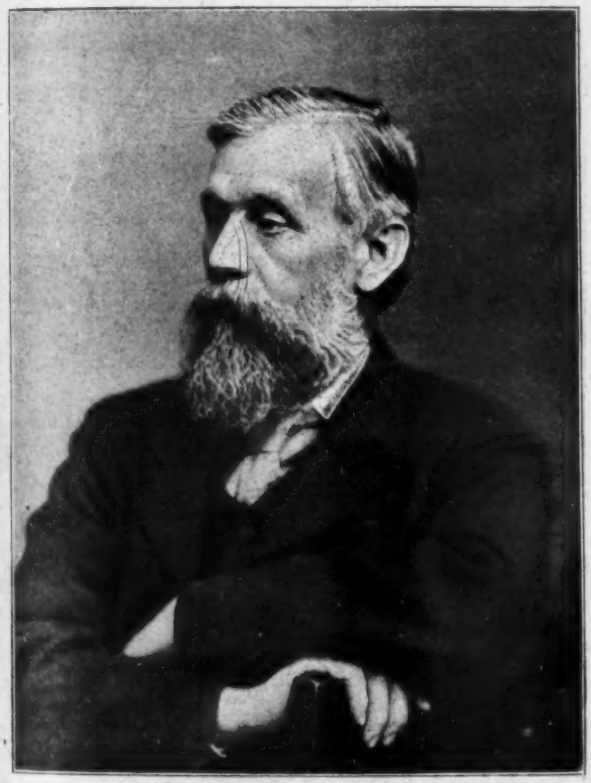

[Photo by Elliott and Fry.

PROFESSOR MICHAEL FOSTER, K.C.B.,
President of the British Association, 1899.

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VOL. XX No. 4

EDITORIAL, PUBLISHING AND ADVERTISING OFFICES OF "THE PRACTICAL TEACHER" 33 PATERNOSTER ROW, LONDON, E.C. — NEW YORK OFFICE, 37 EAST EIGHTEENTH STREET.

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THE PRACTICAL TEACHER

A MONTHLY MAGAZINE AND REVIEW

FOR THE SCHOOL-ROOM AND THE STUDY

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PROFESSOR MICHAEL FOSTER, K.C.B.,

President of the Dover Meeting of the British Association.

BY PROFESSOR J. R. GREEN, D.SC., F.R.S.,

Examiner in Botany to the University of London; Late Examiner in Botany in the University of Cambridge.

THE honour of supplying the President of the British Association has this year fallen to the biologists. Amid the many claimants for the position, Sir Michael Foster has long been prominent; and it is hard to see how any one else could have been selected, when once the turn of biological science came round again.

The intimate friend and collaborateur of Huxley, whose mantle, indeed, may be said to have fallen on his shoulders, Foster has for many years stood out conspicuously as the leader of physiological thought and the inspirer of physiological activity in England, if not also in America. Whether as a leader of research, an exponent of the philosophy of the science, or an author whose opinion is beyond criticism, no man since Huxley has achieved so prominent a position as the present President of the British Association.

Sir Michael Foster was born at Huntingdon in the early part of the year 1836. His father, who also bore the name of Michael Foster, was a physician of repute throughout the eastern counties, and there is little doubt that to his influence the bent of mind of his gifted son may be traced. The latter received his early education at the Grammar School at Huntingdon, an institution of some considerable antiquity, which has numbered more than one distinguished man among its scholars. It was the scene of the early studies of Oliver Cromwell, to mention only one other. After some few years spent at Huntingdon, Michael Foster went to University College School, and later to University College, London, where he received his medical training, and from which institution he graduated as M.D. in the University of London.

After his graduation, Dr. Foster returned to Huntingdon, and for six years practised as a physician there with his father. But a country life afforded altogether an insufficient scope to his disposition, which aspired beyond the trammels of general practice, and felt itself free only in the broader paths of science. At that time the science of physiology was in its infancy. In England there was but little activity, though the minds of many were being stirred by the discoveries of the French school, and particularly by the commanding influence of Claud Bernard. Foster gave up the practice of medicine in 1867, and returned to University College, London, to take charge of the teaching of physiology. Two years later he was made professor of the subject, succeeding to the chair of Dr. Sharpey. London, however, claimed him for little more than a year. The awakening to the claims of physiology as a science was not confined to London, but those claims were felt by a small band of men connected with the University of Cambridge, prominent among whom were Sir George (then Dr.) Humphrey, the professor of anatomy, and the Rev. Coutts Trotter of Trinity College. Attracted possibly by the fascinations of association with the older university, Foster was led through their instrumentality to move from London to Cambridge, where he was welcomed especially by Trinity College,

and was made College Prelector in Physiology. This was practically the turning-point of his career. With but few resources, and with much coldness on the part of the section of the university which was devoted to the older studies of classics and mathematics, he started on the laborious task of founding a school of biological science in Cambridge. How brilliant has been his success is now a matter of history. The story of the past thirty years tells of the gradual but steady, and finally rapid, advance of biological science, using the term in its widest sense; and of all the names which may be mentioned in connection with that advance, none stands out more prominently than that of Foster.

He began his work in a very small way at Cambridge. There were no laboratories, and not even a lecture-room suitable for experimental demonstrations. His early lectures, which were followed by practical illustrative work, were delivered in a long, narrow, galleried room, now used as the Philosophical Library. Soon, however, students rallied round him in numbers. And what names now known to fame were inscribed upon those early rolls! Francis Maitland Balfour, the most brilliant animal morphologist of our time; Henry Newall Martin, John Newport Langley, Gaskell, Sheridan Lea, Vines, Milnes-Marshall, all appear there; men who were deeply imbued by Foster with the scientific spirit, and who carried on his work in other fields than that of Cambridge.

After twelve years' heavy labour at Cambridge, the university made him a tardy recognition by founding the professorship of physiology, and electing him to fill it. Since 1882 he has occupied this position.

But Foster's Cambridge work has been only a part of what he has done. He belongs in no narrow sense to the university, for the larger world of science in general has been his special sphere. He was elected a Fellow of the Royal Society in 1872, and, with Sir G. Gabriel Stokes as colleague, he succeeded Huxley as its secretary in 1881 on the election of the latter to the presidency. This honourable and onerous position has given him renewed opportunities of advancing the cause of science, which he has taken full advantage of, but which cannot be specified in detail in a sketch like the present.

In the field of the literature of physiology Foster has been especially prominent. His large text-book of physiology has grown from one volume to five, and is now in its sixth edition. Its value can be appreciated when it is remembered that it has been translated into every European language, and even into Chinese. It has seen many competitors, but in its unique character no rival. Elementary text-books also owe their being to him. In conjunction with Huxley, he issued the later editions of the latter's introductory manual, a work which exercised in past years, as it does even to-day, a considerable influence in guiding students in the right direction during their early efforts. Foster's name is associated also with that of his most brilliant pupil, Balfour, in the authorship of the well-known text-book of embryology.

In 1878 Foster started the publication of *The Journal of Physiology*, which contains the record of all the more important researches in physiology which have been carried out during the last twenty years. He held the editorship unaided till 1894, when Dr. Langley joined him in the work.

The Encyclopædia Britannica owes to him the article on animal physiology.

Foster's influence in general scientific education has gone far beyond the limits of Cambridge. He was associated with Huxley in the latter's labours in connection with the Science and Art Department, and was for many years his co-examiner of the various schools of physiology established under the influence of South Kensington.

His work in the world of science has often been recognised by those in power, who have enlisted his services on many royal commissions and boards of inquiry. Special mention may be made of his labours in connection with the Royal Commission on Vaccination. In the pressure of other work, he yet found time to make a weekly attendance at its meetings for the space of upwards of five years.

It is not easy to speak of the honours which Sir Michael Foster has received from academies, universities, and other public bodies. Possessed of singular modesty, he never wears the insignia of any except the degree of M.A., conferred upon him by the University of Cambridge long ago when he first went there. He can, however, append to his name D.C.L., D.Sc., and LL.D., all honorary, and given him by various universities. Now, in consequence of well-deserved recognition in high quarters, he can add K.C.B., which, however, in the minds of those who know him, adds nothing to the lustre with which his achievements have surrounded him.

THE MEETING OF THE BRITISH ASSOCIATION AT DOVER.

BY OUR SPECIAL CORRESPONDENT.

THIS year's meeting of the British Association will stand out as a very remarkable one for many reasons.

The special features which may be looked back upon with pleasure are both scientific and social. The accident that its meeting-place, Dover, was selected by Marconi for the exhaustive trial of the new system of wireless telegraphy was, from the point of view of the Association, most fortunate. No discovery of modern times, save perhaps that of the peculiar properties of the Röntgen rays, has excited so much interest, or bears within itself the promise of more widespread utility, than this. Especially important it seems to be in rendering possible communication between ships at sea separated from each other by such distances as to render them invisible to each other. The whole subject is, however, yet only in its infancy, and it is extremely difficult either to foresee or to limit the extent to which this new method of communication will ultimately be employed.

The meeting has afforded an opportunity, which has been eagerly embraced, of exciting the interest of many who have not been entirely scientific in their tastes, in the manners and customs of dwellers in the Austral regions. It is singular that this locality should afford the leading features of interest to the anthropological section at two successive meetings. This year, however, shows them presented under very different auspices from 1898. At Bristol, the hero of exploration was the traveller who called himself Louis de Rougemont, and whose pictures of life in Australia, said to be personal experiences, were exciting enough for the owners of the most exuberant imaginations. At Dover, excitement gave place to research. The expedition headed by Dr. Hadden, which has been exploring Torres Straits and part of Borneo, began to report upon its labours and to indicate its results. No work of similar scientific

BRITISH MUSEUM

value has been done for many years, and that the results were first placed before the leaders of science at Dover has given the meeting of the British Association there a very important position among the gatherings of recent years.

Socially, the meeting has been remarkable on account of the fact that the French Association for the Advancement of Science held its meetings at Boulogne during the same week. The opportunity for the exchange of international courtesy was not lost. For the first time in recent years, one of the evening meetings of the British Association was handed over to a French savant, Professor C. Richet of Paris, one of the leading physiologists of France. He took as his subject *La Vibration nerveuse*. The two Associations exchanged visits of courtesy, the French savants coming to Dover on Saturday, sixteenth of September, and their British colleagues returning the visit on Thursday, twenty-first of September, when the day was spent at Boulogne. An elaborate programme was carried out on each occasion.

A more detailed account of the matters of general and scientific interest must be deferred till next month.

WITH THE BELGIAN AND SWISS TEACHERS.

BY THE EDITOR.

SUMMER months bring with them invitations to foreign Congresses, and for practical teachers who would spend part of their holiday among their brethren on the other side of the water, there is usually ample choice as to country and locality during the month of August. If we take into consideration the immense variety of holiday courses arranged in all parts of Europe, and the exceptional facilities offered in respect of cheap travelling and hotel accommodation, it will be apparent to our readers that the opportunities of intercourse with teachers of all countries are now well within the means of most teachers of Great Britain. Since the publication in our July Holiday Number of the details relating to most of the European students' gatherings, we have had abundant evidence of the eagerness shown on the part of many of our readers to go abroad, and our eyes have been opened to great possibilities and developments in the near future. Descriptive accounts of educational systems in Continental Europe, by well-known and competent writers, have regularly appeared in our columns during the past three years; and the widespread appreciation of these contributions has encouraged us to arrange for special articles in relation to practical school work, students' courses, etc., that our readers may as heretofore be kept in touch with the educational life of our Continental neighbours.

MR. R. WADDINGTON
(*English Delegate*).

OSTEND.

Invitations from Congresses this year have come from France, Holland, Belgium, and Switzerland. In order to obtain a few practical notes, a trip was made to Ostend —the Brighton of Belgium—to be present at the *Fédération Générale des Instituteurs Belges*. Ostend gave the teachers of this association a hearty and cordial welcome on the first

VIEW OF THE PARADE AT OSTEND.

Sunday in September, at the opening of their forty-second Annual Congress. Early on Saturday evening, in addition to the president and the various prominent officials of the Federation, men and women teachers began to arrive from various parts of the country, and by nine o'clock a fairly good number were gathered together at the *reception intime* held in the Cercle Cœcilia.

MR. F. PEAKER
(*English Delegate*).

M. Debreyne, the president of the local committee and organiser of the Congress, gave all a warm welcome, and a pleasant evening was spent by those who were able to be present among so many old friends and acquaintances on the eve of the Congress. In the Place d'Armes a military band played a selection of music, and among the items of an excellent programme the rendering of the Toreador's Song from *Carmen* came in for special appreciation.

On Sunday morning many teachers were to be seen on the magnificent Parade, or quietly wandering along the broad sands enjoying the fine healthy air of Ostend. Ideal weather—*temps vraiment radieux*—tempted all to enjoy a few hours of sunshine and breeze ere the time fixed for the opening ceremony.

At noon, at the Hotel de Ville, M. Debreyne presented the delegates to the communal authorities. The burgomaster, in welcoming the teachers, said,—

> "La population ostendaise, toujours si dévouée à la noble cause de l'enseignement national, est heureuse de recevoir l'élite des instituteurs belges; elle sait combien les travaux des congrès antérieurs ont été sérieux et féconds, et les festivités qu'elle organise en l'honneur des instituteurs ne sont qu'un hommage de reconnaissance à ces dévoués travailleurs."

BELGIAN TEACHERS IN THE PLACE D'ARMES.

THE EDITOR OF THE "INSTITUTEUR BELGE" AND PRESIDENT VAN DEN DUNGEN.

M. Van den Dungen, the venerable and veteran president, then stepped forward, and with much emotion gratefully thanked the authorities of Ostend for their great kindness in receiving the teachers, and concluded by referring to their marked devotion to the cause of popular education,—

> "À peine avez-vous ouvert une nouvelle école, qu'elle est bondée et cela grâce au dévouement des autorités scolaires, du personnel enseignement et de la population."

The foreign delegates were then presented, among whom were Messrs. Waddington and Peaker, representing the N.U.T., and Mr. Van Dam from Holland.

M. DESMEDT
(*A French Delegate*).

The delegates afterwards adjourned to the Salle Blanche at the Hôtel de Ville, where the Congress was formally opened by the president, who concluded his well-received address with the following words:—

> "Il reste beaucoup à faire pour que l'enseignement populaire reponde aux besoins toujours grandissants de la société. Il faut lutter contre les préjugés, contre l'alcoolisme, dont les effets terribles menacent l'humanité. Le remède aux différents maux qui nous affligent, c'est le développement de l'éducation au point de vue physique, intellectuel et moral; et la législation ne devrait

pas laisser l'enseignement sous l'influence souvent mauvaise de l'autonomie communale."

The delegates from England, France, and Holland were presented to Congress, and after suitable speeches from Mr. Waddington and M. Van Dam, M. Burniat, the general secretary, rose and read his long and carefully-prepared report dealing with Belgian education. It is not necessary to give details, as the readers of this journal are already in possession of a fairly complete story of education in Belgian schools, which appeared in our issue for last October, and also in the issue for December 1896.

M. CUYPER.

M. Burniat concluded by referring to:

"La prospérité croissante de la Fédération, qui a maintenant près de six mille membres; les maigres améliorations obtenues du gouvernement; la suppression d'une vingtaine de classes ou d'écoles dans le courant de l'année dernière; quelques détails sur la guerre scolaire qui se continue sourdement; la situation du canton scolaire de Thielt: la ville, qui a onze mille habitants, ne possède plus qu'une seule école communale; les dix-neuf communes rurales ont en tout sept écoles communales: toutes sont mixtes."

The social features of the Congress were all that could be desired, and the following summary of the programme arranged for Sunday will show how the hours were occupied by the delegates:—

Dimanche 3 Septembre.

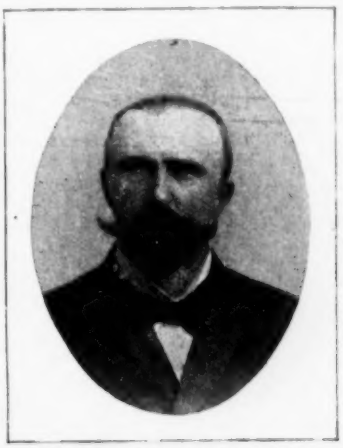
A 11 heures—Réunion au Kursaal.
A 11½ heures—Réception par les autorités communales à l'Hôtel-de-ville. Visite des salons et du musée de peinture.
A midi—Séance d'ouverture au Casino.
A 2 heures—Courses au trot et attelé à l'Hippodrome Wellington.
A 3½ heures—Concert au Kursaal.
A 4½ heures—Représentation du Guignol Lyonnais.
A 7¾ heures—Grand concert de symphonie (106 musiciens), avec le concours de Mme Litvine, de l'Opéra et de M. Debacker, baryton.
A 9½ heures—Soirée dansante au Kursaal.
A 9½ heures—Concert à la place d'armes. Embrasement du kiosque.

M. VAN DAM
(*Delegate from Holland*).

Similar entertainments on the afternoons of Monday and Tuesday were arranged, and on Wednesday special excursions were organised.

The most important meeting of the week took place on Tuesday. A long morning was devoted to the consideration of the following questions: "La dignité de l'instituteur," and "Les Œuvres de prévoyance à l'école." Many teachers took part in the debate, and among the most distinguished speakers was M. Blondiau, whose name will be remembered by all who had the privilege of listening to his speech at the N.U.T. Conference held at Swansea in 1897.

The following is a summary of the conclusions voted upon:—



THE SECRETARY OF THE OSTEND ASSOCIATION.

Première question.—La dignité de l'instituteur.

Les conclusions, après avoir défini la dignité personnelle, montrent l'importance de la dignité professionnelle. Celle-ci exige de l'instituteur beaucoup de qualités, mais le rôle du gouvernement, en cette occurrence, est prépondérant: l'estime, le respect que les concitoyens accordent à l'instituteur se mesure d'après la sollicitude du gouvernement envers l'éducateur.

Bref, l'exemple doit venir d'en haut.

Malheureusement, le gouvernement clérical étouffe la liberté de l'instituteur; il méconnaît son indépendance et sa dignité; il le frappe dans ses intérêts matériels à tel titre qu'il existe encore des instituteurs ayant vingt-cinq ans de service payés (?) à raison de 1,200 francs l'an.

Un membre ayant proposé la suppression des mots "école neutre," l'assemblée en réclame énergiquement le maintien pour la raison que tous les services publics doivent être neutres et que l'État n'a pas à subsidier des écoles destinées à faire disparaître l'école nationale.

Seconde question.—Les œuvres de prévoyance à l'école.

L'école doit s'efforcer de faire naître et de développer chez l'enfant les sentiments de tempérance, de prévoyance, de mutualité, de solidarité, de douceur envers les animaux; sentiments qui font partie intégrante de l'éducation morale.

Elle y parviendra surtout par des *intuitions morales* émanant du domaine de l'enfant, de l'écolier.

Révélations scandaleuses: A propos de l'établissement de sociétés antialcooliques à l'école, des instituteurs révèlent que, dans la Flandre orientale, sept écoles ont été transformées en cabarets!

L'une d'elles, dans la commune de Mullem, près d'Audenarde, porte pour enseigne—ô amère dérision!—"A l'École communale."

Quant à la mutualité scolaire, le congrès rejette la proposition d'établir des sociétés mutuelles à l'école; mais il est entendu que le personnel enseignant se dévouera à la mutualité en dehors de l'école.

Des instituteurs ayant établi des mutualités se sont heurtés à toutes sortes de difficultés. Le clergé veut absorber tout et ils citent ce fait que, dans le canton de Bastogne, il existe quarante-deux coopératives agricoles présidées par des curés. Ces coopératives, avantagées par l'Etat et par la Caisse d'épargne, portent dans leurs statuts: "Pour faire partie de la Société, il faut appartenir à la religion catholique et en remplir tous les devoirs."

M. A. BRONCKART.

At the termination of the Congress the president thanked all who had worked so indefatigably to make the meetings so complete a success. M. Van Meenen, in an eloquent speech, congratulated the assembly upon the great interest of the subjects discussed, especially emphasising the importance of the questions relating to the "Dignity of the Teacher," etc., and concluded by urging the teachers to work vigorously, and carry out in every way the voice of Congress.

BERNE AND ZURICH.

The Permanent School Exhibitions.

In connection with the Jubilee of the Swiss Teachers' Association to be held in Berne next month, under the presidency of Herr F.-Fritschi, Sakundarlehrer, Zürich, and for which great preparations are now being made, an appeal has been sent by Herr Lüthi, *Gymnasiallehrer* in Berne, to the leading educational publishers of Europe, for samples of all specialities in the way of teaching aids for exhibition during Conference week at the Schweizerische Permanente Schulausstellung. The value and importance of an international exhibition of this kind cannot be too highly estimated, and teachers who are able to be present at the "Lehrertag" in Berne will doubtless fully avail themselves of the results of Herr Lüthi's praiseworthy initiative and energy.

The idea of a Permanent School Exhibition is not new. As early as 1856 we find that one was established at St. Petersburg, a second at Würtemburg in 1859, a third at Zürich in 1875, and the fourth at Berne in 1878. To-day, however, great efforts are being made to establish them in all parts of the world, and the secretary stated that, for the mutual benefit of all, arrangements are being made to enter into regular communication with the committees of school exhibitions already opened or about to be opened in Australasia, United States of America, South America, Washington, Toronto, Japan, Paris, Stockholm, Vienna, Copenhagen, Amsterdam, Brussels, etc. To this end it is proposed to establish a sort of permanent international bureau.

THE PERMANENT SCHOOL EXHIBITION AT BERNE.

Having said good-bye to the Belgian teachers, after a night's journey the exhibitions of Berne and Zürich were reached. Both appear to be doing exceptionally good work for the teachers of Switzerland. Teachers are able to call at any hour and examine the leading educational publications produced both in their own country and elsewhere. Diagrams and pictures for object-lesson teaching are in great variety. Apparatus for the laboratory, objects for school museums, specialities in relation to modelling, woodwork, and every form of hand and eye training, are all permanently on view. Maps, atlases, and models in relief for geographical teaching are a special feature of the exhibition.

The object is, of course, to afford every possible facility for examining the latest and best teaching material; and from the statistics available it is very clear that the teachers have up to the present taken the fullest advantage of the exceptional opportunities offered to them. In Berne alone more than ten thousand "objects" were lent last year in the Canton. The postal authorities allow everything to be sent post free to the School Commission of the various communes in each canton. Teachers wishing to have anything sent direct from the exhibition are not exempt from postage, and in order to cover cost of packing and postage, a trifling contribution of two francs is required annually.

In addition to the practical side of the exhibition, there is at Berne and also at Zürich a general reading-room, a most complete library of pedagogy, a large assortment of educational journals, bluebooks, and other volumes relating to the history and development of education in Switzerland and abroad. All these are available for use or reference at any time.

A picture gallery of distinguished educational reformers is also a permanent feature of both exhibitions. At Zürich, Dr. Hunsiker drew special attention to a long series of pictures, chronologically arranged, relating to Pestalozzi, in addition to large models of the well-known monuments of this great teacher.

The expenses are met by subscriptions from members and from the various Communal School Commissions, grants from the towns, as well as building grants from the Government.

To meet the growing needs, larger buildings are in contemplation, and at Berne it is proposed to add a large school garden for botanical instruction.

Other similar exhibitions exist at Freiburg, Neuchâtel, and Lausanne.

The work of each is entirely confined to its own canton, and beyond giving a portion of the financial aid, the Confederation in no way interferes. Free education, compulsory attendance, and religious freedom for all, form the charter of Swiss education, over which the Confederation jealously watches in the interest of every citizen.

It should be mentioned that complete catalogues are issued both at Zürich and Berne; and at the latter a periodical entitled *The Pionier* is regularly published as the organ of the exhibition. Zürich is well supplied with the best of Swiss educational papers, to which reference has often been made in our foreign notes. The *Pädagogische Zeitschrift* and the *Lehrerzeitung* are under the able editorship of Herr F. Fritschi, who, we are pleased to say, will shortly contribute to the columns of this journal.

We understand that Messrs. Cassell and Company will publish this month a new work, entitled *Founders of the Empire*, by Mr. Philip Gibbs. The book contains biographies of a number of the greatest Englishmen (from Alfred, "the model of English kings," to the "Iron Duke") who have played the most important parts in the foundation of the Empire. It will be illustrated by four original coloured plates, numerous portraits, and other illustrations. It is intended chiefly as a reading book for schools, but it will also appeal to the general public.

In order to bring to notice the immense strides which South Africa has made of recent years, the Union Steamship Company are prepared to lend sets of lantern slides for use during the coming season. The slides, which are beautifully coloured, comprise all the latest and up-to-date views of South African towns and scenery. Applications for their loan should be made in the respective districts to:—The Union Steamship Company, Limited, 94–98 Bishopsgate Street Within, London, E.C.; Messrs. F. W. Allan and Co., 125 Buchanan Street, Glasgow; Messrs. H. J. Waring and Co., The Wharf, Mill Bay, Plymouth; Messrs. J. Potts and Son, 26 Sandhill, Newcastle-on-Tyne; Messrs. Dawson Brothers, 18 James Street, Liverpool.

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THE SCHOOL JOURNEY IN FRANCE.

AN INTERESTING DEVELOPMENT.

TO the value of travel as a factor in education the pages of this journal have borne repeated and manifold testimony. Not only have we shown in various articles how teachers in their holiday travels may find educational advantage, but in a succession of recreative travel papers from many pens we have proved that this end has been abundantly attained. Again, we have recognised for some years past how teachers may utilise opportunities of conducting classes of their pupils on little journeys to places of educational interest, and thus help them to instruction which can hardly be obtained in any other way. Our series of "Visits of Instruction," and Mr. Cowham's detailed descriptions of a "School Journey" in the neighbourhood of Croydon and Caterham, have set forth in varied form the very practical teaching which such expeditions render possible.

These remarks are, however, only preliminary to an account of a movement which has lately been brought to our notice for the systematic organisation of school travels in one of the north-eastern departments of France.

The organisation is known as "L'Œuvre des Voyages Scolaires," and its founder and president is Mons. A. E. André, Inspector of Primary Instruction at Reims. In a pamphlet entitled *Les Voyages et leur Utilité dans l'Education*, M. André has published a lucid account of the origin and operations of this institution, which cannot fail to arouse a lively interest in readers who concern themselves with practical educational questions.

The book is dedicated to M. Marcel Dubois, Professor in the Faculty of Literature of the University of Paris, who contributes a commendatory letter as a preface. The author opens with a sort of historical view of the question of school travel. "Travels," he says, "make the mind active, and cultivate it by developing especially the judgment. They stimulate individual initiative, accustom one to depend upon oneself, and to bring one's will into action. It is for life the best school of wisdom." He shows how pedagogic writers of the past have commended travel as one of the most profitable means of education for the young, quoting from one of Montaigne's Essays the advice to cause the child to begin journeying at an early age—"Je vouldrois qu'on commenceast à le promener dez sa tendre enfance." To the question why, he answers: "First, that early youth is the time of life when impressions are strongest, and the power of assimilation greatest. Next, and above all, because Montaigne, like Rabelais, was a foe to mere book-learning (*science livresque*), and a great advocate of the teaching which the world and experience supply." Locke and Rousseau are referred to in a similar way; but M. André points out that in their recommendations these early writers thought only of boys of good family, of young gentlemen—in a word, *aux enfants riches*. "The sons of labourers, of vinedressers and artisans, in their time, counted for very little, and had no need of education." Quoting from a modern writer, M. Georges Leygues, he shows how the case is now reversed. "It is to the children of the workers that care and sympathy are extended. And this is justice; for it is they that form the working portion and the living force of the nation."

Not until the Revolution did this different view of education begin to prevail. The section in which our author deals with this development is of such extreme interest, and indicates so plainly the lines on which he has based his own scheme, that we do not hesitate to quote from it rather freely.

"It was only under the Convention that Portiez, deputy of the Oise, asked the Committee of Public Instruction to seek means of perfecting public education by travels." Portiez submitted his views in the form of a pamphlet, which bore almost exactly the same title as that now adopted by M. André, who says of it that while, like many writings of the revolutionary epoch, it contained much empty declamation, it contained also suggestions that deserved attention.

"Travels," says Portiez, "give play to the imagination; to the mind, discipline; to the spirit, vigour; to the body, strength and suppleness. By them one awakens in the pupils the taste for knowledge, for the arts, for the beautiful, and, above all, for sound morals, and one inspires them with the desire to learn.....It is the most fitting means of preparing the young man to read in the great book of nature and of the world."

The object of a journey, according to Portiez, should be to visit a seaport, a great city, a country noted for its fertility; and the pupils to share in it should be those who are chosen by their comrades in a given district.

Though the project of Portiez did not immediately bear fruit, his ideas were not forgotten; for during the vacation of the year 8 of the Republic, the pupils of the Central School of the Eure made a collective journey in the western part of the department, in accordance with the rule of the school, which provided that "the pupils of the *pensionnat* of the Central School who have gained prizes visit, during the holidays, the places in the department which are most interesting for their situation, for the antiquity of the monuments they contain, for the manufactures carried on, and for the kind of culture in which the people are there engaged. They draw what it seems to them desirable to keep a sketch of; they describe what is worth knowing; they seek the natural productions of the soil, and collect useful or rare plants; they carefully record all the details of their journey in a journal, and they revise the report in common.

"The pupils select the officers for the journey, according to the stock of knowledge they are considered to possess for the kind of expedition of which they will have charge. Two of them are draughtsmen, two naturalists, two are acquainted with physical science, and two with history.

"On returning from their expedition, they place in the school museum the fruits of their researches, together with their journal; and the Council of Instruction revises the printing of that which is thought worthy of being made public."

It appears that in the holidays of the years 8 and 9, the pupils of the Central School of the Eure visited a great portion of the department; but the report of the first journey only was published in the year 10. M. André notes the keen interest with which he read this, and thus sums up its contents:—

"It is a collection of object lessons (*leçons de choses*), as we should say to-day, illustrated with engravings, drawings, and sketches. It contains detailed information on the industrial establishments visited, includes descriptions of the historic monuments and of the most picturesque views of the district, and supplies useful statements about the minerals, plants, insects, etc., collected in the course of the excursions. It is also a faithful exposition of the difficulties encountered from day to day, of the doubts and fears to which they gave rise, and of the researches to which the pupils devoted themselves during the journey, which lasted fifteen days."

When we consider that the date of this record carries us back to the threshold of the century now so near its close, we may be inclined to regard it as ancient history; but it should prove to us—if there be need of proof—that for most of our modern ideas the past can furnish prototypes. From the school journey of the department of the Eure, a short passage of time brings us to another forerunner of M. André in the practical work of school travel; and, by a very easy transition, our author passes on to Rudolf Töpffer, whose delightful book, *Voyages en Zigzag ou Excursions d'un Pensionnat en Vacances*, we have more than once commended to readers of THE PRACTICAL TEACHER.

"Speaking of this trip (of the Central School of the Eure), and of the record which has been made of it, brings quite naturally under the pen the name of the celebrated Swiss teacher Töpffer, who passes, by undoubted right, as the model for directors of school excursions.

"Töpffer, a disciple of Montaigne, did not wish for study without movement and freedom. He set off each year with the pupils of his boarding-school through the cantons of his picturesque fatherland, his course largely determined by chance and fancy. He led his scholars for twenty or thirty days by mountains and valleys, knapsack on shoulders, and instructed them while on the road in direct sight of the

objects and in touch with men. His excursions were inspired by the idea that after having worked well, 'one must see the world, take the air, idle, digest what one learns, observe, and bind knowledge to life.'

"A sincere friend of youth, an enlightened and liberal teacher, Töpffer lived the life of his little tourists (*touristicules*), to whom he often gave the opportunity of making trial of initiative, of energy, of will. He taught them by the life in common to get out of difficulties with one another, and to practise that helpful and frank generosity which is not extraordinarily common, but which is yet so lovable, so worthy of notice, that it walks the very first after the grave procession of the virtues.

"A writer of distinction and an artist full of fancy, he has rendered his records of travel alive twice over by the pen and by the pencil. The *Voyages en Zigzag*, exquisitely natural, illustrated with skill and humour, are for all ages delightful reading. And for the directors of school excursions they will ever remain an invaluable guide."

Another form of the same kind of teaching is that of which our pages have given many examples under the heading "Visits of Instruction," but to which M. André devotes a chapter with the title "Promenades Scolaires." He recognises two kinds of promenades—the hygienic and recreative, or, as we should say, "constitutional," and the promenade of instruction. He holds in high esteem these instructive walks to the scenes of agricultural labour, to the meadows where grasses and other plants may be collected. "The visit to an industrial establishment, to a museum, to an historical monument; the quest of minerals, of plants, of insects—here are so many lessons about interesting and instructive objects which a clever teacher does not fail to utilise for the greatest advantage of the health of his pupils and the profit of their studies; giving to the children at the same time a liking for the industry of the country in which they are born, and in which they are called to live. These walks are more than a means of instruction; they are a process of education. They exercise the faculty of observation; they form the habits of analysing, comparing, judging. They have thus a very healthy action on the principal faculties, notably on the attention, the imagination, the memory, and the reason."

It is further pointed out that in the freedom which must attend such walks, the characters of the pupils are more fully revealed; the teachers learn to know them better, and so become able to lead them more surely in the right direction.

The vice-rector of the Academy of Paris has recently called attention to the importance of *promenades d'instruction*, which, he says, should be made with all the regularity possible in the training college for elementary teachers and in the *lycées* and colleges.

"While it is indispensable to make known to the pupils the essential industries of the country in which they live, and to make use of them to illustrate the theoretic instruction of the class, it is hardly admissible that we should let them remain ignorant or ill-informed about the battlefields, the monuments, the museums that it is possible for us to have them visit, and which will help us better to make intelligible the general history, as also to explain more completely certain important facts of local history. It is therefore necessary that we should turn to profit not only the agricultural and industrial resources of the department, but also its historical memorials and its museums. We must neglect nothing which may broaden and raise the minds of the pupils."

The practice of taking school children for walks of instruction in charge of their teachers seems to be largely adopted in France, in accordance with the above recommendation; but in some places outside France, such walks are a necessary part of the school course. For example, the following are among the regulations for the communal schools of Brussels:—

"There is every fortnight a school walk either in the city or in the environs. The excursions have for their essential object the observation and study of natural or artificial objects which are not found in school, and which are of a nature to furnish ideas and to train the intelligence.

"Before every excursion the pupils receive the information which may help them to understand the things they are going to see. Every excursion is followed by exercises likely to make the remembrance more lasting."

M. André wisely remarks that for these visits to be really fruitful they must be attractive and of varied interest, and that they must not be regulated as strictly as ordinary lessons in school. They should be controlled in a broad and liberal spirit. The teacher should gently moderate the children's natural curiosity, and give his explanations in the pleasant form of a familiar chat. He should help the scholar in his researches, "leading him to appreciate things, and to choose thoughtfully, sometimes opening the way for him, sometimes letting him open it himself."

"But let him never forget that in order to make profitable a visit to a farm or a factory, in order to discriminate between what is suitable for children and what must be passed over, and at the same time to inspire an enjoyment of natural things, it is necessary to know much and to know thoroughly. That is to say, *promenades d'instruction* demand on the part of the master a serious and thoughtful preparation. There is an art of helping to see, of teaching to enjoy, and of instructing without telling too much, which is not at the command of everybody."

In the next chapter we see how this system of instructive walks has been extended in many places by the organisation of occasional longer journeys undertaken for the same general purpose. The author cites examples from Switzerland, Germany, and Belgium. In France, school journeys have been undertaken by several provincial agencies. At Toulouse, a company of thirty-six girls were sent in 1897 to Saint-Gaudens, where they spent fifteen days in the pure air of the Pyrenees. At Grenoble, the town offers annually to the best pupils in the primary schools a journey to some neighbouring place, as to Marseilles, to Chambery, to Aix-les-Bains, and the Lake of Bourget.

At Lille, pupils who succeed in the examination for the certificate of primary studies make an excursion to Dunkerque, where they may bathe in the sea.

Then the Reims Committee of the "Ligue de l'enseignement" have for fifteen years past organised an annual journey of several days for the benefit of those pupils of the city and district of Reims who obtain the primary certificate with special distinction. In 1897 the *caravane remoise* travelled in the beautiful valley of the Meuse, and visited the Belgian towns of Namur and Dinant, as well as the French towns and villages Givet, Revin, Charleville, Mezières, Sedan, and Bazeilles.

This brings us to the special work which the enthusiastic school inspector M. André has established in the last two or three years in Reims. "L'Œuvre des Voyages Scolaires" as organised by him differs from all other associations having a similar object, in its extent, its permanent basis, its public position, and its elaborate organisation. Nevertheless, the germs of this carefully-thought-out scheme are undoubtedly to be found in the principles laid down and the experiments recorded in the earlier chapters of M. André's little work; and it is for this reason, and also because we believe our readers may find much that is valuable and suggestive in these records, that we have made our summary so full.

We must pass over, at least for the present, the chapters dealing with journeys for adults, teachers' excursions, travel in foreign countries, and *colonies de vacances*—the latter corresponding to our plan of country holidays for poor and delicate children.

The purpose of this paper, however, would be very inadequately served if it did not include some definite though brief description of the School Journey Association of Reims, and its actual operations.

The constitution of the society is defined by a series of forty-one articles, and its work is carried out in accordance with a code of thirty-six rules of administration. The area to which it applies is the inspector's district, of which Reims is the centre; and all the primary schools included may share in its advantages. Its objects are thus defined:—

1. To promote a healthy competition among the pupils of all the public primary schools of the district by causing the most deserving of them to share, at the end of the school year, in an excursion which shall be made in the department of the Marne or in the neighbouring region.

2. To accustom the children early to discern and to recognise real merit, and to lead them also from the school to the willing practice of social solidarity.

3. To confirm, to extend, and to make more exact the general knowledge acquired in class, and to develop a taste for the beautiful in nature and art.

4. To make better known especially the geography and the history of the country where most of the children are called to live, and so to develop in them the spirit of patriotism—the enlightened love of their own neighbourhood (*la petite patrie*) being the fruitful germ of the love of the French fatherland.

The society is composed of several classes of members—*benefactors*, those who contribute to the funds a sum of a hundred francs, either in one payment or in two consecutive years; *founders*, who contribute at least ten francs; *honorary members*, who subscribe at least two francs a year; *subscribers* of one franc a year; *adherents*, of half a franc annually; and *participants*, the pupils who pay one decime (1d.) each year. Thus provision is made for people of every social rank to share in the work.

M. André attaches much importance to the small uniform subscription of a decime per year from each pupil of legal school age, as a simple manifestation of the social duty which it is desired to cultivate, as giving to the association a special character as a work of solidarity and of brotherhood—an idea well summed up in the motto of the organisation, *Tous pour Un. Un pour Tous!*

Subscriptions or subsidies are also made by the communes, by the schools, by the department, and by the state; and funds are also raised by fêtes, concerts, sales, authorised lotteries, and collections.

The administration is in the hands of a council of twenty members, six being members by right—namely, the inspector of the district, and the presidents of five cantonal committees—and fourteen members elected for three years. The latter include five mayors, chosen to represent the school authorities, and nine teachers, six masters, and three mistresses. The elections take place at the annual general meeting of the association. The council meets twice a year, and oftener if necessary; and the routine work is carried on by a bureau consisting of the president, two vice-presidents, a secretary, and a treasurer.

The rules of administration provide rather minutely for the organisation of the school journeys, which are of two kinds. First, there is a *caravane d'honneur*, which includes, of right, the candidates who have obtained in the year the certificate of primary studies with the mark "very good." These share in an excursion extending over three to five days. The *caravanes cantonales* are composed of pupils chosen in the various schools of the canton in proportion to the number of children from six to thirteen years of age on the school registers. From a mixed school of fifty scholars two are chosen, if possible—one boy and one girl; and for larger schools the proportion is one for every fifty or fraction of fifty. The election is made by the pupils themselves; but to be entitled to a vote, they must be of school age and in regular attendance, not having been absent more than thirty times without excuse recognised by law. Those only may be elected who are between the ages of eleven and fourteen, who have been distinguished for their good conduct, and have not been absent more than ten times without lawful excuse.

M. André defends this mode of election as a sort of initiation into civic life, and also an incentive to the good public spirit of the school. In a democratic society like ours, where the destinies of the country depend upon the intellectual and moral worth of the electoral body, where nine-tenths of the electors pass only through the primary school, it is of the highest importance to promote at an early age the education of the conscience and the reason.

"Modern life is only a continual exercise of judgment on things and on men. Election is everywhere, at every step of the social scale. It is wise and prudent, therefore, to prepare the generations for the duty which awaits them of exercising and strengthening that judgment to which society is going in the future to have such frequent recourse, and which will prove its strength or its weakness, its ruin or its safety.

"Only during the last fifteen years has civic instruction been inscribed on our school programmes. We say to-day to the children of our primary schools: To vote is a duty incumbent on every citizen; he must discharge it honestly, disinterestedly, independently."

The cantonal excursions are, as a rule, for one day only. The rules provide for careful supervision. A conductor has the direction of each group, and is assisted by two superintendents (usually teachers), one master, and one mistress, or more if the company of children exceeds forty. Indeed, it is suggested that there should be one adult to every ten. The children and those who take charge of them have their expenses paid out of the society's funds.

The rules further provide for what is called a "sanction" or educational justification of the excursion, in the form of a competition in which each participant has to produce a report of his travelling experiences and of what he has learned from them. This examination appears to be made a serious matter, and prizes of books, collections of views, etc., are awarded to those who render the best accounts.

We must not omit to state that the association has an organ of its own—the *Bulletin de L'Œuvre des Voyages Scolaires*, an illustrated periodical, appearing in quarterly numbers of similar size to our own journal, and published at seventy-five centimes per number. The two first issues are before us, and they contain reports of the affairs of the society, interesting accounts of the journeys taken, programmes for the future, and papers on the historical and other associations of places visited. We may possibly return to the matter of this *bulletin* in a future paper.

It is worth noting, however, that the society appears to be in a flourishing state financially. In 1897 the receipts amounted to 4,077 francs, the number of members was 1,608, the number of journeys accomplished was five, the number of pupils who participated 247, and the total expenditure 2,443 francs.

In 1898 the receipts rose to 4,879 francs, the excursions to six, the participating scholars to 273, and the expenditure to 2,870 francs. The balance in hand at the beginning of this year was 3,642 francs.

We do not anticipate that the scheme in its entirety is likely to be adopted by any educational authority in this country, but it may afford many suggestions which may be turned to good account. There can be no doubt whatever that the founder of the society has done an excellent work for his own district. He has contributed not only to the spread of knowledge, but to the increase of happiness and the strengthening of human ties in a manner which deserves success, and, as it seems to us, with a success on which he and his co-workers may be sincerely congratulated.

While preparing this account of the School Journey in France, we have come upon an interesting announcement of the adoption of the idea by the Barnsley School Board. In this case the scheme, as *The Daily News* suggests, has probably been based on the school journey as carried out in Germany. "The classes will be taken through the valley of the Don, during the six or seven days, returning each evening—not, like the stalwart young Germans, camping out, or sleeping on straw in school halls. Right along the valley, on to the Humber and the sea, the boys will be shown every object of interest—the wide-spreading moorland, the reservoirs of water storage for the big towns, the ruined abbeys and castles and their historical associations, the industries and employments of the district, and the general geography and botany *en passant*." Of such journeys we are likely to hear more, as they can hardly fail to have excellent effects.

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NEW VARIED OCCUPATIONS:

PAPER FLOWERS.

THOSE of our readers who were specially interested in the lessons we gave under this heading in our August number may perhaps like to be reminded of a paper somewhat allied to them which we published in November 1897. The latter was headed "Form, Paper, and Colour Work at the British Museum," and was intended to draw the attention of teachers, particularly of those engaged in higher kindergarten work, to the fact that the Museum authorities had just then acquired the well-known collection of paper flowers made by Mrs. Delany in the last quarter of the eighteenth century. It was the first time the public were privileged to see them, their possession till then having been in the lady's family.

The repetition of some little items of information given in that paper may possibly be of service to some one who is intending to introduce flower-making into a school curriculum.

The entire collection of Mrs. Delany's flowers, in many volumes, is in the care of the keeper of the Print Room, who will, on application, allow a reader, after signing the visitors' book, to peruse them one by one. A treat is in store for anybody who will take the trouble to see them. Viewed from the standpoint of paper-work they are really wonderful, each flower being as true to nature botanically as in its colouring. Further interest also attaches to them when it is remembered that they are the work of a lady who had already passed threescore years and ten, and who was as near as any one could be the sincere friend of a royal pair. Both Farmer George and his queen looked on at times to see these flowers grow under the scissors, and Her Majesty was so gratified with the ingenuity shown that she had a special set of instruments made for the paper botanist's use.

We are very sure that no kindergarten teacher will regret a morning spent in the British Museum Print Room over these time-honoured and really beautiful paper mosaics.

INTERNATIONAL CORRESPONDENCE:

LEARNING LANGUAGES BY LETTER-WRITING.

DURING the holidays many English teachers, wishing to improve their knowledge of a foreign language, have taken advantage of the opportunities which the season has afforded of living for a short time among the people who speak it as their native tongue, and so have put to the practical test the surest of all means of learning a language. The ordinary tourist, as we are constantly hearing, does not find, indeed he does not usually seek, this advantage. Everywhere in the hotels he is wont to frequent he meets with crowds of his own countrymen; and the waiters, servants, and shop-assistants cap his questions, put in awkward French or German, with pat replies in correct English, oftentimes to his great relief.

In the centres where holiday courses for language-teaching are conducted, there is, of course, much opportunity of practice in hearing and speaking the language of the lecturers and teachers. But for gaining a practical acquaintance, say, with colloquial French, perhaps there is nothing so effective as staying in some country district with some fairly educated people who speak no language but their own.

In a recent number of the French *Revue des Revues*, our good friend M. Mieille, full of enthusiasm in his educational mission, points out how essential in these days is a knowledge of modern languages, and especially advocates the claims of English to the attention of his countrymen. Why, he asks, had such an officer as Marchand not studied English? This is not the place to follow and discuss M. Mieille's suggestion that it would be better for French education if the Lycée boys under twelve years of age were taught by ladies.

The same *Revue* contains another article on the subject of modern language teaching by Professor Fernand Herbert, who thinks that the preference shown for German should cease, that English and German should be placed on the same footing, and that parents should be able to choose either for their sons. "We *must* learn modern languages," he says; "the safety of our commerce, our industries, our nation depends upon it." But he considers it a mistake for the ordinary schoolboy to attempt the learning of two modern languages simultaneously. It appears that though German is compulsory and English optional for boys in French schools, the majority of the girls learn English instead of German, for the reason, it is supposed, that the former is the easier language.

In connection with *The Review of Reviews*, the agency for placing pupils of English schools in correspondence with French and German school children is still in active operation. We sometimes receive from teachers applications to arrange for their scholars to correspond with scholars in France; but in all such cases we forward the application at once to Miss Lawrence, who acts for Mr. Stead in that department of his work.

From the mid-September issue of the *Review* we quote the following intimation:—"Will schoolmasters notice, and will our friends who can remind such, that we hope for very full lists of boys this month and next, October being (for many) the beginning of the school year? Boys' names are always in demand; but our girls have often to wait long, and many have been waiting for months already."

We note with interest that, according to a recent report of the German Central Office for International Correspondence, the scholars now in correspondence number 4,882, and the schools interested are—German, 189; French, 185; English, 72; American, 29; or altogether, 475. The writer in the *Review* remarks: "Surely it is not difficult to realise that the results both to teachers and scholars, even now when the scheme is in its infancy, must be great. What will its maturity achieve? I should like English schools to come to the front more, and I hope more exchanges will be effected."

For ourselves, we shall be glad to receive the names of any of our readers who may feel disposed to enter into correspondence with French teachers. We will do our best, in conjunction with Armand Colin and Co. of Paris, to find correspondents for them. Writing letters in French, and correcting the English of those received from a French *confrère*, may form a pleasant as well as a profitable way of spending some of the long evenings of the coming winter season.

The Society of International Correspondence, which has its headquarters in Paris, continues to receive "adhesions" from persons anxious to carry on special correspondence with others in foreign countries. The name of its monthly organ has been changed from *L'Etranger* to *Concordia*, as indicating that one of its chief aims is the promotion of the comity of nations and international peace.

Other signs are not wanting that the movement for the more extensive and more effective teaching of modern languages is very much alive. Among them we note the appearance, in a reprint from *Education*, published at Boston, of a paper on International Correspondence by Professor Gaston Mouchet, à l'Ecole Colbert, Paris, in which the work done in America by Dr. Magill and the association of professors of modern languages in America is described.

M. Mieille wishes us to make known that the Rector of Toulouse, at his request, is kindly disposed to welcome in the training schools of his academy any young pupil teachers who would like to spend one or two years in France, paying a fee of £20, and being boarded, etc., with only the light duty of giving one hour's conversation every day to his French comrades.

Any "postulant" has only to address an application to the Rector of Toulouse, stating his age and qualifications, and giving references.

At the moment of going to press, MM. Armand Colin et Cie. write from Paris as follows:—"Un de nos abonnés désirerait un correspondant anglais, habitant *Southampton*. C'est un professeur d'école commerciale, âgé d'une trentaine d'années. Nous vous serions reconnaissants de vouloir bien nous faire connaître, si cela vous est possible, le nom d'un correspondant anglais qui puisse lui convenir."

EDUCATIONAL INSTITUTE OF SCOTLAND.

THE SEPTEMBER MEETINGS.

FOR the past ten years at least, the annual "fixed" meeting of the Educational Institute of Scotland has been particularly fortunate as regards weather, and Saturday, September 16, with its bracing air and brilliant sunshine, was no exception. As a result, therefore, there was an exceptionally large gathering of teachers—both delegates and non-delegates—some of whom no doubt were attracted by the hope of seeing a new and interesting display of school books adapted to the new requirements of the thoroughly rational and much-lauded new Code, others influenced by the expectation of meeting old friends, renewing acquaintanceships, and exchanging ideas on their work. On the other hand, the preceding Friday, on which the usual series of meetings that cluster round the September meeting of the Institute is held, was cold, blustering, and disagreeably wet. Notwithstanding the inclemency of the weather, the "Old Guard"—rapidly thinning in ranks—were out in good numbers. The meeting of the

Burgh and Parochial Schoolmasters' Association

takes precedence in point of time and age. Mr. Young, Dalkeith, submitted the committee's report, which dealt with the representations made to Sir Henry Craik regarding the continuance of Privy Council pensions to old parochial teachers, and recorded with satisfaction that the Scotch Education Department had intimated that Privy Council pensions were to be continued in the meantime, and that all teachers appointed prior to August 6, 1872, were eligible for a pension. On the appearance of the Code of 1899, another statement was drawn up referring to the hardship that no pension should be given to a teacher over sixty-five years of age on whose behalf application for the same was not made before he had attained that age. In reply, Sir Henry Craik intimated that the Department was not prepared to alter this, and thought it improper to adopt a different age of retirement from that fixed by Parliament in the Act of last session. The committee hoped, however, on further consideration, the Department would remove that disability. The report adopted, the president (Mr. Liddell, Channelkirk) gave his retiring address, in the course of which he spoke with satisfaction of the freedom introduced by the new Code, and expressed the hope that the annual tinkering of the Code would end, and a sufficient number of years be allowed to test it thoroughly before any new changes were introduced. The treasurer intimated that the following retiring allowances had been granted during the year—one at £340, one at £220, three at £200, one at £174, one at £150, one at £145, two at £133, 6s. 8d., one at £130, two at £120, one at £100, two at £75, four at £70, two at £65, and three at £60; and that the average reached the satisfactory sum of £125. How gladly would existing teachers welcome this! An interesting discussion then ensued regarding the attitude the parochial teachers should take to the Superannuation Act. Dr. Mackay, Edinburgh, advised acceptance generally. The next meeting consisted practically of the same members, who, it may be said, filed out of one door and entered by another, to take part in the proceedings of the

Schoolmasters' Widows' Fund.

From the report of the Standing Committee, it appeared that there had been a decrease in the fund during the year of £1,448, 13s., and that the total fund at the date of the closing of accounts was £103,483, 15s. 11d. To meet the annuities for the year, a further realisation of capital was necessary. The president (Mr. Borrowman, Auchtermuchty) briefly sketched the history of the fund since its establishment by a few far-sighted Fife schoolmasters. Since 1821 the annuities had risen in the various classes £25, £20, £15, £10, and £5 to £41, 5s., £33, £24, 5s., £16, 10s., and £8, 5s. at the present time. The question now before them was whether to continue the fund for some years as at present managed, or at no distant date to hand over its management and liabilities to a respectable insurance company, which would continue to pay all existing and future annuities until the last widow upon their list had enjoyed her share. That time, he feared, was speedily approaching, and they ought to be making all provision for the safety of the fund in the near future. The Institute has, we believe, had the subject of the creation of a widows' fund under consideration, but at the present time they feel it inopportune to go on with it. The success of the old fund might in the end induce them to favourably consider such. From both of these meetings we missed many of the old forms that annually were present, many of them towers of strength in the Institute and the Institute's work.

The youngest association, too, takes advantage of the large concourse of teachers in Edinburgh at this time, and holds its meeting of Emergency Committee on the Friday evening. This committee is chiefly deliberative in its work, and as a result many of the items of business before it will in due time come before the executive of the Scottish Assistant Teachers' Association in November. Till then little need be said of its deliberations. Mr. Robert G.

MR. W. SCOTT STEVENSON, STIRLING
(*President, Currie Club*).

Dickson, M.A., ex-president of the Association, was appointed to represent the Scottish Assistant Teachers' Association at the National Federation of Assistant Teachers' meeting at Merthyr Tydvil in October.

Moray House and Currie Clubs.

The clubs connected with the two training colleges in Edinburgh also hold their meetings on the Friday. Moray House Club begins early in the evening. The first part consists of a business meeting, at which, no doubt owing to the fact that many members have to come by train, the attendance this year was very small. The secretary reported that the membership now stands at 1,237, an increase of 32 members. The library and benevolent fund in connection with the club seem to be in a very flourishing condition. In order to allow members to renew their college associations and acquaintanceships, an interval of an hour is allowed between the dry yet necessary business part and the conversazione. During this interval many old college friends arrive and enjoy the hospitality of the club, so that when the president is ready to deliver his retiring address, which as usual forms an autobiographical retrospect, the large hall is well filled. A very interesting programme of song and recitation, interspersed with speeches from the delegates of the sister club and others, is gone

through. Unfortunately your representative cannot be in both places at the same time, so that, however reluctantly, he must bid the older association adieu before the end of the programme is reached, and hie to the Chambers Street College, in which is being held the Currie Club meeting, under the presidency of Dr. Alex. Morgan. The attendance was very small—so small that the committee, we believe, are seriously considering the advisibility of changing somewhat its nature. Dr. Morgan in his retiring address gave a very interesting account of his recent visit to the schools and colleges of France and Switzerland—the former of which carries centralisation to perfection, and the latter decentralisation. The president is rapidly earning a name for his papers on Continental systems, and we may express the hope that he will soon publish in handy form his papers on the subject. After the business proper the company engage in dancing, which is maintained with vigour till a somewhat late hour. We should like to see some of the older members of the club gracing the proceedings with their presence. The absence of these struck us very forcibly after our visit to Moray House.

The Educational Institute of Scotland.

The Royal High School quadrangle was crowded with teachers when we arrived, and from its appearance many had been early on the scene. This is due to the fact that the exhibition of books becomes uncomfortably crowded long ere the meeting begins. This overcrowding seems to suggest that the place of meeting will soon have to be changed, and the largest hall in Edinburgh secured for the annual gathering. Prior to the meeting of delegates, the Fellows of the Institute meet to approve or disapprove of the recommendations of the Board of Examiners with regard to the new Fellows. This year all were passed, but a discussion took place in respect to one applicant, who, as it turned out, was from *furth* Scotland, and yet was not a member of any other teachers' association. In future, as the result of the discussion, we fancy the Board of Examiners will look more closely to the observance of the rules.

Punctually at eleven o'clock the president (Mr. J. G. Thomson, Paisley) enters the room, in which we have with difficulty secured a seat. He is accompanied by the officials—Dr. Mackay, treasurer; Mr. Laurence, secretary; Dr. Dickie, and Messrs. Marshall, Dunlop, and Martin, ex-presidents. We miss the presence of Dr. Ross, Dr. Morrison, and Dr. Campbell, well-known figures at this meeting; and the venerable secretary, Dr. Smith, too, is absent. These are a distinct loss to the Institute, both in council and in debate. With the standing orders and minutes of last annual meeting approved of, we are ready to listen to the address of the president. Last year, he says, has been variously described as one of revolution, of devolution, of evolution. When we reflect (1) upon the degradation of the exemption or labour certificate, and the exaltation of the once-despised merit certificate, on the substitution of "block" for "piecemeal" grants, on the abolition of the once-reverenced standards, on the installation of higher-grade science schools and commercial schools, on the flitting of Science and Art from South Kensington to Dover House, we see that *revolution* is not too strong a term for the changes that have marked the year—changes greater in their scope and more thorough in their intensity than any that have astonished our educational world since that terrible upheaval the "Robert Lowe" earthquake of 1861; changes, nevertheless, which have been accepted so quietly on all hands that we rest in assurance of the beneficence of the revolution.

When we consider that the school henceforth is not to be examined class by class, but is to be judged rather by its output of merit certificates, and that the inspector is to adjudge less on products and more on processes, we observe that much is *devolved* upon the teachers between the infant stages and the stage for the inauguration of secondary work. The very motto of the block grant is "Trust the teacher," and it is a great matter that his living personality should be substituted for the dead weight of the Code. An added responsibility *devolves* upon head-masters in "settling the proper gradation of classes, and arranging a well-balanced curriculum for each." On the inspectors, too, *devolves* greatly-increased responsibility in the assessing of merit with so much less of formal examination.

But, in the third place, the year has been distinguished most of all by the Codal *evolution* of the flower of well-ordered training from the folded bud of information-storing. Government has declared that the aim and goal of all school work should be character-forming, and the development of mind by natural processes of teaching and training, so as to secure, not temporary pass results, but increase of power in observation and reflection, in alertness and self-reliance, in intelligence and *morale*. This *evolution* of the true inwardness of education seems to be the crowning glory of the 1899 Code.

We are, as teachers, bound to be grateful for the beneficent revolution thus effected in our favour and that of the children; and we may be confident that our inspectors, on whom devolves the difficult task of embodying these Code-evolved ameliorations in their practice as guides, philosophers, and friends, will rejoice to carry them out in the spirit in which they have been conceived.

While thankful for past improvements, we still hope for future betterment. We are, in fact, educational Chartists, with at least six points in our charter-bond, three of which are general, three professional, but all in the best interests of education.

He then proceeds to deal in brief with the six points:—

1. We must have allotted to us a larger portion of child-life. This is a question of supreme import; and if we are to retain, or rather regain, our place in the world of school, we must abolish half-time schooling. We must make the "merit" the exemption certificate, or even shift forward the exit gateway to the seventh standard, as London has already done. We must institute all means, alike for the sake of national physique, of mental drill, and of moral training, whether in day school or evening school, to keep hold of our youths through nature's educational term—the period of adolescence.

2. We must have co-ordination of school agencies, including authorities and grants. We suffer from a plethora of administrative bodies and systems. We have lines of demarcation where we should have lines of communication.

3. The maximum of education should be made accessible by the State to all. The country requires that each and every social stratum should be tapped for talent.

4. The supreme place occupied by education in the nation's mind demands improvement in the status of the educator. A closer connection with the university, formally to obtain rank as a profession, we must have. The avenue of the inspectorate must be opened, and the rank and file must have increased remuneration.

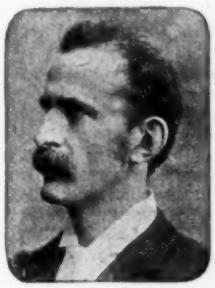
5. Our superannuation scheme requires great changes to make it what it ought to be.

6. Security of tenure must be attained. Lord Balfour of Burleigh's Dumfries speech comes in for well-merited praise, and the three axioms therein contained, the president thinks, are notable as the finest Departmental enforcement we have yet had of three principles the Institute has repeatedly enunciated—(1) That the residue grant must be ear-marked for higher education, not spread on our highways in broken metal; (2) that all funds set apart for secondary education might be fused into a common fund; and (3) there must be some authority for higher education in which County and Burgh Councils should have a share of representation.

He refers with pleasure to the fact that the Educational Institute of Scotland conducts the preliminary examination for the great medical profession and other bodies, and that it has now been approached by the Pharmaceutical Society to conduct its examination. He would like to see negotiations opened with Chambers of Commerce for the framing of a commercial certificate, such as ought to form a passport to the better positions in our mercantile offices. By such means the resources of the Institute might be so strengthened as to buy up *The Educational News* and make it the official organ of the Institute, and perhaps at no distant date we might secure for ourselves representation in Parliament.

In concluding his able, suggestive, and thoroughly practical address, Mr. Thomson referred to the great losses the

Institute had sustained during the year in the death of Dr. Morrison, the genial teacher, and of Dr. Campbell, the perfervid orator, and in the serious illness of Dr. Ross, the able administrator.



MR. W. S. BLACKSTOCK
(*President, E.I.S.*).

Notwithstanding these losses, he adds in a beautifully poetical peroration, the sacred cause of education goes on unhasting, unresting, towards the final goal of the perfection of our race. Honoured be every one that helps onward its beneficent march. With what a sturdy stride it has advanced in our own brief day, in universality of application, in depth of range, in tenderness of spirit! How many have been involved in its improvement—imperial statesman, local ruler, intelligent newspaper editor, educational thinker, faithful teacher! To us belongs its daily load, its hourly cross. But we must remember that wherein it is a sacred cause, its gains are not to be measured in bank-notes or in earthly honours, but in something higher, better, more enduring. What avocation can make the teacher's proud boast of sending forth into the world every year to all manner of business and social duties half a hundred young men and women trained in the way they should go?

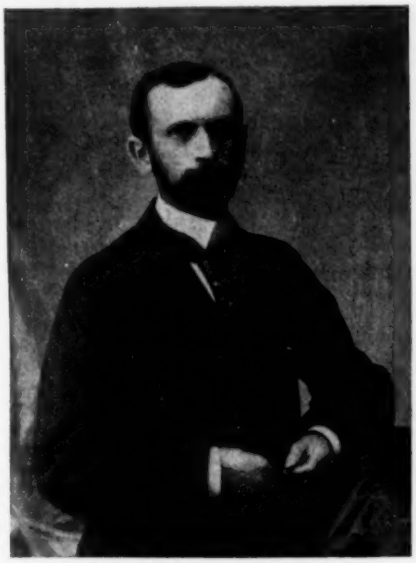
In the great contest that is evidently destined to mark the twentieth century—the contest not of warships, but of merchant ships; not of fortress and soldier, but of factory and trader—in that warfare the teacher's work will count for much; and we, as teachers, must remember that in that struggle not knowledge only makes success, but *morale*, not technique, but character—obedience, courage, integrity, reverence. Our profession will rise in esteem, in importance, in beneficence, the more it is seen that the character of the good teacher is stamped, it may be unconsciously but ineffaceably, on the mind and heart of the rising generation. The lifetime of the world itself will not exhaust the blessed results of the work in which we are engaged. He that is

MR. J. BEATTIE, M.A., RECTOR, HIGH SCHOOL, OBAN
(*Vice-President, E.I.S.*).

least in the teaching fraternity is greater than the greatest in the world's eye who has taught the world nothing.

New Office-Bearers.

Mr. Thomson formally proposes as his successor Mr. Wm. Blackstock, Dunnikier Public School, Kirkcaldy, who has been elected by the votes of the members. The senior vice-presidents, Messrs. Mackenzie, Aberdeen, and Ingram,



MR. EDWARD M'CURRACH, NEW ABBEY
(*Vice-President, E.I.S.*).

Wishaw, are sent in search of the new president, "who, like Saul of old, has hid himself among the stuff." On his arrival the whole meeting rises to its feet and welcomes him with enthusiasm. Mr. Thomson, in handing him the chain of office, expresses the hope that the Institute's work will go on prospering during his tenure of the chair. Mr. Blackstock gracefully accepts the office, and thanks his fellow-teachers for the honour done him. Having signed the roll of presidents, he calls on Mr. Martin, Edinburgh, to convey the thanks of the meeting and of the Institute to the ex-president for his great work during the year, and for his interesting address this morning.

On the motion of Mr. Mackenzie, Maryburgh, one of the valiants of the Institute, we agree to the nomination of Mr. J. Beattie, High School, Oban, to the position of vice-president of the Highlands and Islands; and on the motion of Mr. Innes, Ayr, of Mr. Edward M'Currach, New Abbey, Dumfries, for the vice-presidency of the South-West Province; Mr. J. Laurence is re-elected secretary; and the president then calls on Dr. Mackay to submit the

Financial Statement for the Year.

He reports that the finances are in a sound condition. During the year the income from dues of membership amounts to £928, 8s., and though the expenditure, owing to the increase of activity of the Institute, is advancing by leaps and bounds, yet he is able to report a gratifying surplus balance of £215, 17s. 8d. The new members this year amount to 1,011—an increase in nearly all the branches, but notably in Glasgow. This increase, he considers, is largely due to the work done by the Organisation Committee under its convener, the late Dr. Campbell. The membership, judging by fees paid, stands at 5,520, as against 4,994 last year—an increase of nearly 600. The total membership, however, stands at 6,120. This means that there is a considerable number of arrears. We should like to see the Organisation Committee directing its attention to this leakage, so that the actual increase of new members might practically be synonymous with the increase of each year. The medical examination account shows also a balance, and it is to be hoped that the conducting of examinations will be more widely extended, as the president hopes. The benevolent fund has increased its balance by nearly one-half. From one point of view this fact is exceedingly gratifying, but from another it may be questioned whether the grants given

are not too few and too little. It may be that the hardy independence of Scottish teachers prevents more frequent demands, or that the fund is not sufficiently understood by the bulk of the members. There are in this fund immense possibilities. The critics of the finance fund are not present to-day, so that without discussion we approve of the report, and thank and re-elect Dr. Mackay.

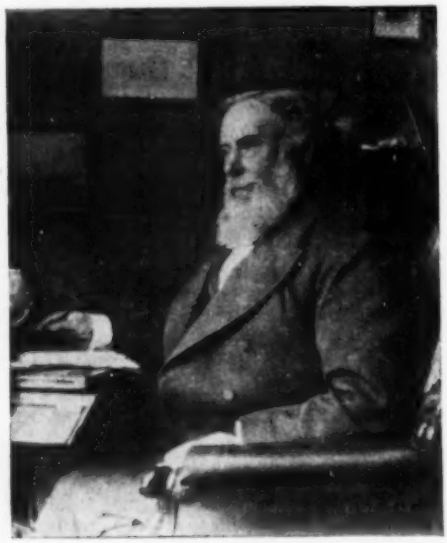
Reception of Fellows.

Mr. Laurence submits the report of the Board of Examiners, from which it appears that there had been received from the various branches forty-six applications for the degree of F.E.I.S., and from members outside Scotland seven. Of these fifty-three, the Board of Examiners accepted forty-one from the branches and four from *furth* Scotland. He recommends that Dr. Ross, the present secretary to the Board of Examiners, who is laid aside on account of dangerous illness, be retained in office, but that Dr. Dickie, Kilmarnock, be appointed interim secretary. The Board of Examiners is practically re-elected—Mr. Lowson, High School, Stirling, taking the place of Dr. Campbell.

We have now reached what rumour had been saying would cause the only breeze in the meeting—namely,

Provincial Representation.

The secretary gives in his report, which shows that in the majority of the branches the new scheme has been approved of. The more important features of the scheme may briefly be said to be the following: annual election of members of the General Committee; voting by provinces as opposed to districts; vote by voting papers, and not at an annual district meeting. Mr. A. C. Mackenzie, Maryburgh, as representing



DR. DICKIE, KILMARNOCK
(*Interim Secretary to Board of Examiners*).

a smaller branch, seconds the scheme. Mr. Forbes, Clydebank, in moving its rejection, says it is impossible not to sympathise with the efforts of the Institute during the past few years to place its representation on some plain and just basis, but he does not think the present scheme will serve the ends therein indicated. The present scheme will result in the disfranchisement of the smaller branches. Mr. Keys, Kintore, seconds, and in doing so says that it would be worse than madness to adopt the secretary's motion. Mr. Gibb, Ayrshire, shows that the smaller branches will not suffer at the hands of the larger branches. There seems to be little desire on the part of the delegates to continue the discussion, largely, no doubt, because of the fact that scheme after scheme has been before the general meeting for the last half-dozen years, and we seem to be "no forrader." By a large majority it is agreed to give the scheme a fair trial, and the annual bugbear of this meeting is dismissed.

It is agreed to accept the invitation of the Edinburgh Branch to hold the annual congress in Edinburgh during New-Year's week, the 3rd and 4th of January being the dates.

This brings the forenoon sederunt to a close, and on account of the expedition with which the business has been got through, it is resolved to have an interval of an hour.

At 1.45 the business is resumed in presence of quite a handful of delegates. The minutes of the General Committee of Management call for some lively passages at arms between the secretary and Mr. Fulton, Greenock, who objects to an overture from Renfrewshire being shelved and passed on to the Superannuation Committee. As the result of this discussion, it is agreed that all overtures shall in future be printed in full in the minutes.

Parliamentary Committee.

The secretary, in submitting the report of the Parliamentary Committee, states that representation had been made to the candidates at the three elections which had taken place during the year in Scotland, chiefly on questions of pensions and tenure of office, and recommends the re-election of the committee for next year. Several delegates object to the wholesale re-election, with the result that nominations are asked for for the five places. A number of gentlemen are nominated—as a rule, one from each of the various provinces; but after the nominations have been received, Mr. Fenton, Aberdeen, moves that, "as a matter of courtesy," the president be elected without vote. The phrase catches on, and another delegate rises to move, for the same reason, that Mr. Thomson, ex-president, be also elected without vote. Similarly Mr. Laurence, general secretary, is elected; then Mr. Mudie, Dundee, vice-president; and lastly, Mr. Duthie, Aberdeen. So that, "as a matter of courtesy," and in one or two cases "of expediency," the new committee is elected. This is probably the most farcical election which has taken place at any meeting of the Institute, and to many seems to cause considerable disgust, not because of the men chosen, but because of the method of choosing.

Superannuation.

The president, as convener of the Superannuation Committee, submits the report of the committee. It stated that a deputation had been sent to London to lay before the Department the great dissatisfaction felt by Scottish teachers with regard to the withdrawal from School Boards of the right of granting supplementary pensions, and also with the smallness of the amount of State pension granted to existing teachers. The committee resolve to take further action with regard to the pension for existing teachers, and it is proposed to hold four or five meetings during the ensuing winter on the same day, at the larger centres, with this view. Mr. Blackstock recommends the acceptance of the Superannuation Act, and hopes that at April 1, 1900, the vast majority of Scottish teachers will be working under the Act. If that were the case, he thinks there will be little fear that an early modification of its provisions will result.

Mr. M'Kenzie, Aberdeen, proposes that the teachers of Scotland respectfully call upon the secretary of the Treasury to take such steps as might be necessary to increase the superannuation grant to existing teachers, so as to put them on an equal footing with those appointed after the Act, and so remove an injustice which the terms of the Act inflict upon them. This is unanimously agreed to.

Higher Education.

Dr. Mackay briefly submits the report on the above. The committee, he says, has been very busy during the past year in preparing the report of the commission appointed by the Institute to take evidence throughout Scotland on the subject of higher education. He says they are under obligation to have this report ready for the General Committee of Management in October, and expresses his belief that it will be a volume of great service to the teachers and educationists of Scotland.

A discussion takes place round the motion of the ex-

president to secure the general observance of Easter week as a holiday throughout Scotland. It is objected by one delegate that the introduction of "a paganising and popish festival," such as Easter is, will be met with refusal by many of the school boards and town councils throughout Scotland. Mr. Thomson, however, carries his motion. But a second amendment, to have a "spring holiday," is proposed, which is lost by a majority. A third amendment, by Mr. Beattie, Oban, however, is carried—that it be remitted to the General Committee of Management to consider the date of the holiday in the spring, which it is desired to make general, and the procedure to be adopted.

The rest of the business—the election of the General Committee of Management, proposed amendment of rules, appointment of auditors—is rushed through, and the fifty-third annual meeting of the Institute closes at three o'clock, with a vote of thanks to the president.

If the quick dispatch of business, the absence of any discussion whatever, and the general indifference of the delegates, as evidenced by the afternoon sederunt, be taken as a vote of confidence in the officials and Committee of Management, then the business of the Institute is being ably and successfully conducted. The Institute is flourishing like a bay-tree, and it is to be hoped that the increase of membership betokens a wider and deeper interest in its affairs, and a more thorough knowledge of the influence it is able to exert.

Meeting of Lady Teachers.

Taking advantage of the number of lady teachers present from all parts of the country, a meeting was held in South Bridge School in the afternoon, to consider how women could best aid in furthering the good of the profession. Over two hundred and thirty ladies attended, and the greater number partook of refreshments before the business began. Mr. Alexander, Edinburgh, occupied the chair, and expressed his pleasure at seeing such a large gathering.

Miss Cameron, Edinburgh, spoke of the need for union among women teachers, and introduced a scheme by which women teachers all over the country might get into touch with one another. She proposed that there should be a secretary, with a correspondent in every district. These would bring any important matter relating especially to women before the lady members of the Committee of the Educational Institute on the one hand and the general body of women teachers on the other.

Miss Hamilton, Glasgow, next read a paper on Superannuation. A suggestion was made that men and women should receive the same annuity. This could be obtained by both paying the same yearly contribution.

Mrs. Skea, Aberdeen, introduced the subject of the position of women teachers. To the great regret of many, time did not permit Miss Brander, Edinburgh, taking up the subject of country teachers.

DR. ROBERT OGILVIE.

THE news of the death of Dr. Robert Ogilvie, Her Majesty's Chief Inspector of Schools, will be received with great regret by all teachers and educationists throughout Scotland. He had been in weak health for the last nine months, but all his friends hoped that he would soon be restored to health, and spared to demit office in November next, and retire into that rest which he had so well earned by his great efforts on behalf of Scottish education.

Dr. Ogilvie was the youngest son of a Banffshire farmer, five of whose sons have attained to eminent distinction in the educational world. Educated at the parish school of Rothiemay, Dr. Ogilvie removed in 1852 to Aberdeen, to attend the famous Grammar School of that city. In due course he entered the University of Aberdeen, where he gained a bursary. All through his student course he distinguished himself, in nearly every class carrying off the first prize, and finally winning the Gray Mathematical Bursary of £60. Not in mathematics alone, however, did he excel; for he was a most distinguished classical scholar, and took his degree with honours in 1856. His first appointment was to the parish school of Banchory, where he succeeded Mr. John Black, who had been promoted to an Inspectorship of Schools. In 1860 he became rector of Milne's Institution, Fochabers, in succession to his brother; and in 1868 he became Inspector of Schools, in succession for the second time to Mr. Black. In 1869 Dr. Ogilvie was transferred to the Stirling district, and in 1882 he was promoted to be one of the three Senior Inspectors for Scotland, and was transferred to Aberdeen. Six years later he was appointed to Glasgow. In the same year he had the unique honour of receiving the degree of LL.D. from Aberdeen and St. Andrews. In 1896 he was promoted to the Chief Inspectorship. On the occasion of his leaving Glasgow he was entertained to dinner, when about two hundred educationists were present. He was also presented with an address, in which the great public services, and the zeal, and tact, and discretion with which he had discharged his duties as an inspector, were cordially recognised. The same qualities have endeared him to the teachers of the metropolis in which he has laboured for the last three years.

The words he used in reply to a presentation he received from the teachers of Aberdeen truly describe his aim and methods: "I have never considered the letter of the Code to be the be-all and end-all of a teacher's ambition, and I have never consciously sacrificed what was weighty and educative for mere anise and cumin. If the instruction was tinctured with the ingredients Opie mixed his paints with, I have striven to appraise and encourage it."

True words, as every teacher who has met him in school knows. His proud boast was that he had never wronged a teacher, and the boast was warranted.

His love for the children, his zeal for the Latin, his urbanity and judiciousness, were conspicuous wherever he went.

It is but a few months since the writer of this asked him to give a paper on his reminiscences during the past forty years, but he put him off with the expressed intention of doing so when he had laid his harness aside. That was not to be; he was not to enjoy that period to which in all probability he would have devoted much of his time to bring out a Latin Grammar. If I may be allowed to alter a word or two, I would say,—

> "Virtuous and wise he was, but not severe;
> He still remembered that he once *did teach*."

JUVENILE LABOUR AT THE TRADES' UNION CONGRESS.

THE following resolution was proposed by Mr. Curran (London) at the recent Trades' Union Congress held at Plymouth:—

> "Considering that the employment of children in factories and workshops, and on board river and canal craft, and their consequent exploitation by the capitalist, is injurious to the children, unjust to their parents, and a crime against the human race; considering the infamous fact that the children of the working class have not the same opportunities of the classroom and the playground as the children of the capitalist class; considering that in this connection Great Britain is behind other countries; considering that unhappy parents, under an unhappy system, are actually willing, and even anxious, to have their children torn from school and hurried into the factory, this Congress is of opinion that the time has come for Great Britain to cease building its empire on children's hearts, to give up coining its wealth out of children's wasted lives, and hereby instructs the Parliamentary Committee to demand as a temporary minimum from the Government (*a*) the abolition of child labour under the age of fourteen, and (*b*) of all night labour under the age of eighteen."

An amendment, to omit the rhetorical phrases about ceasing to build empire on children's hearts and giving up coining wealth out of children's wasted lives, was defeated, and the Congress gave in its adhesion to the resolution by 587,000 votes against 171,000. It is gratifying to learn that the delegates of the unions are sound on the question of raising the age for juvenile labour to fourteen.

Our Monthly Retrospect

EDUCATION IN ENGLAND.

N.U.T. NOTES, ETC.

BY T. B. ELLERY, F.R.G.S.,

President of the National Union of Teachers, 1895–96.

The Chairmanship of the Law Committee. In last month's notes I referred to the resignation of Mr. Shadrach Hicks. He attended a meeting of the Law Committee early in September, and presided for the last time over its deliberations, receiving at the close of the proceedings a very hearty vote of thanks for his past services. The Executive on the following day also passed a resolution thanking Mr. Hicks for his seven years' valuable work on behalf of the Union, and expressing the hope that his future career would be in every way an unqualified success. As there cannot be any break in the work of the Law Committee, the Executive proceeded at once to appoint a successor to Mr. Hicks. There was no competition for the post, the members recognising that the only possible candidate was Dr. Beach, who has for some time rendered excellent service as vice-chairman. Elected unanimously, therefore, the doctor starts well, and there is no doubt he will give a good account of himself in the chair which has been filled by such men as Mr. George Girling, Mr. T. A. Organ, the late Mr. C. J. Addiscott, and Mr. T. H. Jones, now the chairman of our Tenure Committee. Mr. W. Hurden (East London) was unanimously appointed vice-chairman.

Our Dutch Brethren and the Boers. The Executive, at the same meeting, had before it interesting communications from the Teachers' Associations in Holland. They referred to the crisis in the Transvaal, and appealed to the elected representatives of the N.U.T. "to protest against those men of authority in England who threaten the independence and the right of self-government of the Transvaal." In the second letter we were reminded that Holland and England stood side by side against Louis the Fourteenth and Napoleon. We were also told that it was our duty to raise our voice in the name of our "mighty Union," and to say, "Do not fight against a small people that wants to manage its own affairs in its own manner."

The reading of the letters elicited some sympathetic cheering, and for a moment there seemed a danger of action being taken on the lines suggested. But the danger passed away, the Executive recognising that it was not a political body. No doubt a majority of those present would have been in favour of a protest against "English interference," if personal, instead of representative, votes could have been recorded. It says much for the good sense and judgment of the members, therefore, that they refrained from entering upon a debate which might have done more harm than good. It is quite certain that if a resolution had been proposed as suggested by the writers of the letters, some of us would have been compelled to move, second, and support the previous question. As it was, the president ruled that no motion was permissible, and the Executive acquiesced without a murmur.

The N.U.T. Examinations Board. The new secretary, Mr. A. A. Thomas, B.A., has begun his work in excellent style. If the Examinations Board should be a failure, the blame cannot, in my opinion, be placed upon him. He is an able man, energetic, and thoroughly enterprising. I have just received a copy of the Syllabus for Commercial Examinations in 1900, in which are to be found some important additions and alterations.

The Education Department now recognises commercial correspondence and office routine as a grant-earning subject in evening continuation schools. That being so, the Examinations Board has made many changes in its "course," all of them on the suggestions of practical business men. "In modern languages, great stress is laid on the necessity for practical work. Numbers, values, weights and measures, with their equivalents, are demanded from the first stage; and commercial terms, with the names and qualities of articles exchangeable in trade, are required throughout. The requirements in shorthand have been extended so as to give speed tests up to 120 words a minute. In addition to the usual certificates, silver and bronze medals are offered for proficiency in this subject. In advanced commercial arithmetic, the student will be expected to have a knowledge of the money systems, weights and measures of our foreign customers, and to be expert in converting them into their English equivalents. Manual training for boys, and needlework and domestic economy for girls, are included in the syllabus. Commercial geography and commercial history now appear for the first time in the list of subjects for which certificates will be granted at the March examinations."

All this is in addition to the pupil teacher examinations conducted by the Board. With such a man as Mr. Thomas at the head, and with the earnest support of members of the Union, who can do much, if they will but try, to make this "new departure" known, there is no reason why this distinctly educational side of the Union's work should not become a great success in every way, and not from the financial point of view only.

The Accommodation at Russell Square. Members of the Union may possibly be surprised to hear that the office accommodation at Russell Square is altogether inadequate for the work which is now being carried on. Those who have visited "71" have probably concluded that the rooms at our disposal would be sufficient in number and size for years to come. The fact is, however, we are handicapped seriously by the want of further accommodation. I can remember "those upper rooms" in Fleet Street when it was next to impossible to carry on the affairs of the Union with a membership of only twelve or fourteen thousand. Mainly owing to the exertions of Mr. W. J. Pope, the great champion for a rational system as opposed to the percentage craze, a small committee was appointed to look round for a new home. As chairman of the Finance Committee, I was one of this committee, and well do I remember the efforts we made to obtain a suitable building. Almost by accident we were drawn to 71 Russell Square, when we had almost decided upon another house in the same neighbourhood. The membership has risen from 14,000 to over 40,000; several new officers have been appointed, all of whom require rooms in which to carry on their special work; and we let portions of the building to the Orphan and Benevolent and Provident Societies. The present state of things, it is clear, cannot go on indefinitely. *Something* must be done in the way of securing increased accommodation, and the sooner the better. Whether anything will come of the idea to buy or erect buildings which will provide all that the Union requires, and at the same time give "club" facilities, etc., etc., I do not know, but I believe the men are to be found who are prepared to advance the necessary money. As a speculation this should be an excellent investment.

The New Orphanage, "Passmore Edwards." I regret that it will be impossible to give details of

Next Month:

NOTES ON

THE BRITISH ASSOCIATION MEETINGS.

Specially written for Practical Teachers.

the opening ceremony in the October issue of THE PRACTICAL TEACHER. These will probably appear in the November number. All that can be said now is, there is every prospect of the 23rd being a real red-letter day. Mr. Passmore Edwards has never spent his money in a better cause, and I shall be much surprised if the day does not provide as delightful an experience for him as for those who are directly connected with the charitable work of the Union. I can imagine how proud Mrs. Burgwin will be, and what a charming little speech she will make. The chairman of the council, too, Mr. J. Hodge, should be in a particularly happy frame of mind. He has been a hard worker, and will, I am sure, do all that is possible to make the day a success. With fine weather—if we could but command it—the band of Her Majesty's Royal Scots Guards, violin solos by Miss Fanny Woolf, the attractions of a *café chantant* in "The Dell," a good concert, illuminated grounds, etc., etc., we shall have a day of enjoyment which we shall not readily forget.

The "Aid Grant:" what is it doing? When the question of further financial aid was under discussion in the House of Commons, it was remarked over and over again that the effect of the "new departure" would be, *not* to increase the efficiency of the schools, *not* to increase the salaries of teachers who had been wretchedly "paid" (save the mark!) in the past, but to encourage the friends and supporters of the voluntary schools to reduce their subscriptions. That this has been the result to a certain extent is proved by a recent return.

The Executive of the N.U.T. has now sent out a circular showing what has really been accomplished in about a thousand voluntary and endowed schools in rural districts of England and Wales. In a majority of the cases apparatus has been improved, in rather more than a fourth of the cases additional teaching staff has been secured, and in about two schools out of five the teachers' stipends have been increased. But there are so many instances of maladministration that nothing short of a Government inquiry, it seems to me, will satisfy the general public. Here we have a case of a grant of £25 being made for the specific purpose of improving the defective apparatus in use in a certain school, *yet the money was used by the managers to pay off debts four years old!* Surely this is a matter that should be inquired into without delay. It will not be difficult to supply names and dates. In other instances, none of the special aid grant has been expended in the direction of increasing staff and salaries, though it was expressly stated on the forms that the money was for that purpose only. It can be proved that in one school at least the aid grant of £20 has been banked, and not expended at all. In another school, an assistant teacher did not receive the £12 voted for his benefit.

Sir John Gorst should order an Inquiry. It will scarcely be believed that the aid grant has been withheld because managers have refused to admit into their schools the gentleman popularly known as the "organising visitor," but it is a fact all the same. I can quite understand that in certain cases an experienced, sympathetic organising visitor may be of some assistance, but it is monstrous that pecuniary assistance should be withheld because the managers do not wish to avail themselves of his services. One teacher declares: "We receive no aid grant (though the school is starving), because we decline the organising master." Another teacher says: "We were offered £2 if we would receive the organising master, but we declined."

These are serious statements, but the Executive can give chapter and verse for every one of them. I trust, therefore, Sir John Gorst will see that this scandal does not continue. Those managers who are guilty of the practices referred to in this circular, and the federations which are imposing conditions such as those I have mentioned, should be called upon to give an account of their stewardship.

It must be understood, of course, that the circular is not, and was never intended to be, an attack upon voluntary school management generally. From my own knowledge I can state that many managers are loyally carrying out the wishes and instructions of the Education Department. Salaries have been increased, the staff has been strengthened, and better apparatus has been provided in a very large number of schools. I will never be a party to any wholesale condemnation of voluntary school management, for I am certain it is undeserved. Still, when gross cases of abuse come under our notice, it is our duty to make the facts public.

The Teacher vindicated. The result in the Linthwaite, Aston, and Brinton dismissal cases should make managers and members of School Boards hesitate before taking hasty action with respect to the teachers whom they employ. Fortunately for those directly concerned in the cases above mentioned, the Union brought its powerful influence to bear, and used every legitimate means to secure justice. In every instance the teacher has been reinstated. Mr. Reynolds, at Linthwaite, has now a majority of the Board in his favour, and Mr. Stead has received three months' notice, together with an intimation that he need not again attend the schools. This is as it should be, for Mr. Stead should never have consented to accept the post from which Mr. Reynolds had been so unjustly dismissed. I have already referred to Mr. Plant's case (Aston), and there is therefore nothing more to say except to congratulate Mr. Plant, as Her Majesty's Inspector has already done, upon his return to the school in which he has laboured so successfully. The Brinton (Norfolk) case is another example of what the Union is able to accomplish on behalf of its members. In a former note I gave details of the case. I have only to add now that at the first meeting of the new School Board Mr. Thwaites was reinstated in his post, to the great delight of practically every man and woman in the district. Mr. Thwaites has sent me a very interesting letter, for which I tender him my best thanks. Every Unionist, I am sure, will join with me in heartily congratulating Messrs. Reynolds, Plant, and Thwaites upon the result of the battles fought in their interests. May they long remain at their posts.

"The Old Guard." The teachers generally known as "The Old Guard" have sometimes felt, I fear, that little or nothing has been done by the Union to secure justice for them in the matter of pensions; but if so, they are wrong, for no stone has been left untouched that could be turned with advantage to the parties concerned. Over and over again representations have been made on their behalf. Quite recently the Superannuation Committee received a deputation of some of these older teachers. On that occasion Mr. Barton made a very effective speech, giving the history of the movement, and much valuable information. Following this up, the Executive has decided to obtain as many facts as possible from the local associations, in order that further agitation may be carried on. Let me appeal to teachers generally to send us every bit of information which may be of use. There must be no delay.

TECHNICAL AND SECONDARY EDUCATION.

The Scotch Higher-Class Schools' Report. THERE does not seem to be any reason why, in the matter of education, England should be treated differently from Scotland; and yet the issue of the report of Sir Henry Craik on the inspection of higher-class schools and the examination for Leaving Certificates in 1899 shows the marked difference which now exists. In the one country, the correlation between the primary and the secondary school is not only not insisted upon, but the desire seems to exist to make the delimitation of the primary school from the secondary as complete as possible; while in the other, the public State-aided schools hold their own with the secondary schools in doing the higher-class work, not only with the sanction but with the approbation of the Scotch Education Department. It is true that complaint is made, even in Scotland, when children are drafted into the higher schools by means of bursaries, that scholars are not always fitted to take their places in the same class with those who have had the advantage of being trained with a view to higher education. But the managers of

secondary schools are advised that they will find it to their advantage to provide special training for the holders of scholarships when they first enter the school, inasmuch as the holders are of good capacity and of earnest purpose, and their presence will do good, not only to themselves, but to the scholars who have been in the secondary school from an earlier age.

Value of Inspection of Secondary Schools. The report shows that the inspection of higher schools in Scotland, begun in 1886, has had a good effect in raising the standard of education in Scotland. It has helped to show the difference between sound and specious work. No results, as shown by the Leaving Examination, are satisfactory without the further test of inspection. Points of weakness have, by the latter means, been discovered, defects have been removed, and the curricula have been altered, curtailed, or developed. The instances in which a school has become thoroughly inefficient by defects in methods, or by unwillingness to attempt radical reforms, are now seldom met with, although they were frequent in the early years of inspection. Moreover, the inspection has applied a stimulating criticism to all schools, has aroused a healthy public opinion, and, in connection with the Leaving Certificate Examination, has made it impossible almost for a school to live which does not keep itself in touch with the general advance in efficiency.

The application of such inspection to English schools will be attended with similar results. The experience of Scotland seems to have guided the Education Department in England in the selection of inspectors. No fixed staff is employed, although the appointment of a limited number of State inspectors is foreshadowed; but in the selection of inspectors, the chief aim has been to obtain the services of those who have had experience in scholastic affairs, with special qualifications, and the necessary strength of will and tact to pronounce a sound judgment on a school without unduly interfering with the prerogatives of the managers and the teachers.

Leaving Certificates. In view of the possibility of the adoption of some general system of Leaving Certificate in England, the statistics and other information supplied in the blue book on the subject cannot but be interesting to teachers in primary and secondary schools. The severity of the test and the high standard of attainment required for a Higher Grade or Honours pass has served to lessen the number of candidates, which now has assumed a normal level. This year there were 15,377 candidates, who worked 51,052 separate papers: 4,898 of these candidates, who worked 19,866 papers, were from 81 higher-class schools, while 10,479 candidates from 314 departments of State-aided schools worked the remaining 31,186 papers. It will thus be seen that there were more than double the number of candidates from the latter kind of schools, but they worked on an average only three instead of four papers. Nearly 24,000 certificates were issued as the result of the examination. The subjects of examination include English, Latin, Greek, French, German, and Mathematics; and the passes are distinguished as Lower Grade, Higher Grade, and Honours. A pass in either of the two latter classes exempts the holder of Leaving Certificates from the preliminary examination of the Universities of Oxford and Cambridge, the Scottish Universities, and a number of professional bodies who hold such examinations.

It is worthy of note that of the 685 schools presenting candidates, 289 presented pupil teachers only. An examination of the papers shows that a high standard is expected, and that the Honours Certificate implies not only thorough teaching, but individual ability beyond the average. The Scotch pupil teacher who passes this examination creditably has a much better chance of success in university examinations during his training college career than the ordinary English pupil teacher.

Notes. The Irish Intermediate Examination Board provides in its report for an alteration of the method of assisting schools. Payment by results of individual passes is now done away with, and help will be given on the general efficiency of the schools.—The various examining bodies claiming to have been the first to conduct secondary school examinations seem now to be agreed that the College of Preceptors started the practice in 1850.—The policy of the Department respecting the recognition of authorities under Clause VII. continues to meet with the opposition of the School Boards and their organs in the press.—The Fabian Society has passed a number of resolutions respecting the control of education, advocating one authority locally as well as centrally for all grades of education.—The prospectus of the London Board Evening Continuation Schools shows no diminution in its higher classes, although some of the subjects to which objection was taken are not now included.—Speculation is still rife as to the composition of the Consultative Committee of the Board of Education. It has been unofficially stated that one man and one woman will be the representatives of primary schools.

EDUCATION ABROAD.

BY E. E. FOURNIER D'ALBE, B.SC., A.R.C.S.

In the *Revue Pédagogique*, M. Merimée gives a gloomy account of the state of elementary education in Spain. Two-thirds of the adult population are illiterate, and two and a half million children go without schooling of any kind, and that in spite of "compulsory school attendance." Still, there is no lack of legislation. There is hardly a country in Europe, says the writer, which is loaded with legislative enactments concerning education to the same extent as Spain. It looks as if generations of statesmen had had no ambition except to legislate in educational matters. But there is an appalling gulf between the letter and the spirit, between the programme and the reality. One may well be struck with the chaos hidden behind a façade so rich in heterogeneous ornaments. The training colleges were established in 1839, reorganised in 1840, suppressed in 1853, re-established in 1857, joined temporarily to the universities in 1868, and have altogether had a very chequered career. The schools in the Cadiz district have been inspected, on the average, once every two years and a half. And that is a good average. It will evidently require all the sacrifices of the best public men—and Spain has still a good many of them—to make up for lost time.

* * * * * *

In the *Allgemeine Deutsche Lehrerzeitung*, Herr H. C. Schnack, a German-American teacher, gives some sound advice to Germans desirous of acquiring the English language. He puts down five years as the period necessary for fully mastering the language, three of which should be spent in a country where it is spoken. The period named seems somewhat long; but then the author does not consider the language as fully acquired until the learner is capable of expressing his thoughts fully and faultlessly in the new language, and has mastered the pronunciation and construction perfectly. Sojourn abroad is absolutely essential, for at home the temptation to fall back upon the native language is too strong to be overcome. The author regards the pronunciation and the spelling as the most formidable difficulties in the way of acquiring English—the grammar, in spite of the curious irregular plurals, being simplicity itself in comparison with German. He recommends learners to pay special attention to dialogues and conversations. Of all world-languages, English is probably most difficult to acquire effectively from books, though probably easiest to acquire by word of mouth. On the Continent it is considered a good deal more difficult to learn than French. But that may be due to its having gained ground rather recently.

* * * * * *

The Centre party in Bavaria has put forward a demand for abolition of the State monopoly in education. The demand that every one shall be free to choose his own profession, and to qualify himself for it wherever and however he chooses, seems a very reasonable one. It is only when the teacher is regarded as a civil servant that the right of the State to verify his qualifications comes in. It is

well known that in all civilised countries the elementary education of the people is largely State-aided. If teachers were to rely upon the school fees for their total remuneration, the present fabric of instruction would soon fall to the ground. The demand of the Bavarian Catholics is therefore based upon a fallacy, if it implies the awarding of State grants to teachers who do not submit themselves to State examinations. On the other hand, the demand that clerical persons, including male and female religious orders, should be allowed to teach, appears to be quite reasonable. If they are duly qualified, there is no reason why they should not be paid by the State for any good educational work they do. In any case, a religious minority should not be compelled to frequent the schools in which the majority are of a different persuasion.

* * * * * *

In connection with the last Conference of the South African Teachers' Association, held at Port Elizabeth, the Cape Town *Educational News* says:—"There is probably no part of Her Majesty's dominions in which at the present time there is a grosser scramble for eminence, or rather pre-eminence, than in this colony. Fair and open competition is a good thing in any line of life; but the rivalry as between one village school and another, the underselling in prices by one boarding department as against its next neighbour, the ostentation occasionally displayed over the marvellous growth of numbers within a given period—these are some of the matters which keep our Conference from attaining the highest results, and which might well be discussed in Conference. Meanwhile we offer them to local associations for consideration. The rivalry referred to is forced upon the country by various circumstances. Whether it be wholesome or not is a very moot question. Certain it is that the immediate effect is the reverse of being beneficial to education in the true sense of the term, and in so far as it is represented by active local association work or the best results at Conference."

* * * * * *

The following is a specimen of an advertisement for a Kindergarten teacher in the Orange Free State, printed in Transvaal Dutch:—

Benoodigd Kindergarten Onderwijzeres voor de Gouvernements School, te Senekal, O.V.S.

APPLICATIES voor bovengenoemde betrekking vergezeld van de bij de wet vereischte getuigschriften van bekwaamheid, goed gedrag en lidmaatschap eener Protestantsche Kerk, zullen door den ondergeteekende ingewacht worden tot op den 30sten Augustus, e.k.

Werkzaamheden indien mogelijk dadelijk te beginnen.

Salaris £120 per jaar.

Billijke reiskosten, gestaafd door kwitanties zullen vergoed worden.

N.B.—De geslaagde applicant moet zich voorzien van een onderwijzers spoorweg certificaat om tegen half prijs te reizen.

H. GUDATH, Sec. Sch. Com.

Senekal, 10 Juli, 1899.

* * * * * *

The Pioneer of Madras deals somewhat sharply with *The Spectator's* article on "Rotten Cultures," as applied to the native official class in India, who are described as "devoting the whole power of most acute minds to acquiring just so much knowledge of English ideas as will enable them to pass for a degree, after which they put forward their claims to all official posts, and are proud of the distance between themselves and the uninstructed vulgar."

"As part and parcel of the British system of administration," says *The Pioneer*, "it has become necessary, from financial and political considerations, to admit the natives of this country to offices of increasing responsibility, and, even in the lower grades of the service, to demand from them a closer approach to the standards of European efficiency. For this purpose it is a postulate that the administration should draw upon material fashioned by English training; and so far from timidly deprecating such education as a test of Government service, we see therein the essential and indeed unanswerable justification of the heavy tax upon the ratepayer's pocket required to support it. Practical men of the world, neither holding a brief for the Government nor pledged to any theory whatever, may well feel not a little weary of utterly negative and irresponsible criticism like that of *The Spectator*.....To put the case in a nutshell, India, if it desires to retain its place among civilised governments, must either overstrain its resources by paying for more Europeans, or continue to supplement them by natives with an English education. The present system, if fair allowance be made for blunders of trial and the exceptional difficulties presented by the conservatism of the country, has justified itself by such benefits to the administration as might in any reason be expected of it. It is, in fact, beset only to an intenser degree with the same problems as have in one shape or other arisen within a not very distant period in almost every country of Europe."

THE NATIONAL HOME READING UNION.

THE book-lists for 1899-1900 issued by this Union are now ready. As usual, they are three in number—namely, Young People's Section, General Course Section, and Special Course Section. The first of these is the list most useful in day schools, Sunday schools, and evening continuation schools. The subjects it embraces are history, biography, literature (Shakespeare, prose and poetry), travel, science, romance, and humour. The books recommended can be obtained from the office of the Union at advantageous rates, and the subscription fee from the leader of a young people's reading circle is only 1s. 6d. There is an excellent magazine published monthly, which is forwarded free to each subscriber; and as it deals with the books of the year in scholarly fashion, is a great aid to a busy leader. The aim of the National Home Reading Union is to encourage *reading at home*, and the idea of the circle in connection with this home feature is the discussion with others of the books read under the guidance of an older and abler person.

Needless to say that in day schools the books of the Union may be used as class readers, and discussed in the ordinary way. It may be added also that at the end of the year they may form an excellent well-chosen addition to the school library. We note on the list this year *The Penny Newspaper*, which some people think a necessary accompaniment to juvenile readers nowadays, as a preparation for their future citizenship.

For the teachers themselves, especially young ones who wish to continue students, nothing better can be found than the guidance of the General or the Special Course Sections (subscription fee, 2s. and 3s. respectively). A circle of not fewer than five persons, meeting regularly at a given place to discuss a book read at home, and helped by the magazine, is often to its members the only means of co-operative intellectual enjoyment available in a sparsely-populated district, and gives to them something of the advantages known to town students in university extension lectures—men of the highest reputation as scholars giving their services in the preparation of the Union's lists.

Fuller information may be obtained from the secretary, at the National Home Reading Union Office, Surrey House, Victoria Embankment, W.C.

JUST ISSUED FOR OBJECT LESSONS.

LARGE MAP OF THE STARS.

Size, 34 inches by 37 inches, beautifully printed in Blue on stout Manilla Paper, with Marginal Illustrations showing comparative sizes of the Planets, Lunar Crater, etc.

Metal Mounts at top and bottom. Price **1s. 6d.**

London: THOMAS NELSON AND SONS, 35 and 36 Paternoster Row, E.C.; Parkside, Edinburgh; and New York.

OUR CLASS ROOM AIDS

NOTES OF A LESSON ON EVAPORATION AND CONDENSATION.

By WILLIAM DONE, B.A., *Head-Master of Brighton Pupil Teachers' School.*

(See Supplement presented with this Number.)

Articles of Illustration.—The diagram accompanying this month's PRACTICAL TEACHER, a small kettle and the means for boiling water, a glass flask to show convection currents, some pieces of ice.

OBSERVATION AND EXPERIMENT.	TRUTHS TAUGHT.
Set up the apparatus for boiling the kettle previously to the lesson being given, so that the water may boil just as the lesson commences.	The boiling water issues from the spout of the kettle in the form of a white cloud.
The children will probably say that the white issuing cloud is steam.	
Note that there is a small space between the spout and the white cloud where nothing is visible.	Where the steam just issues from the kettle, it is invisible, and only appears as a cloud after coming into contact with the surrounding cooler air.
If we looked inside the kettle, in the space between the top of the kettle and the surface of the water, we should see no cloud.	
Refer to a similar appearance at the funnel of a locomotive.	
Insert a piece of cold glass or slate in the steam, just as it issues from the spout, and a second piece in the visible cloud.	This is a further confirmation of the previous inference.
Take a glass tumbler, wipe it dry outside, and then put some water and pounded ice inside. The outside speedily becomes covered with a mist, forming small globules of water, similar to what were formed on the cold substance inserted in the steam from the kettle.	Cold will turn the steam again into drops of water. The cloud a little distance from the spout is already beginning to form little globules of water, because the colder air acts like the cold piece of glass or slate.
	The air also contains water in an invisible form. (Give the terms vapour and water dust.)
Take the glass flask, in which some water has been heating by a spirit-lamp or gas flame placed below. Drop a little colouring matter, such as litmus, into the water, and note the convection currents more readily. Currents are seen to rise from the bottom of the flask, up the middle, and then set downwards again along the sides, making a complete circulation. After the bubbles of air have passed off, other little bubbles are seen to form at the bottom, to rise and burst, but eventually to rise to the surface.	The bubbles which are seen to rise from the bottom are bubbles of steam, which at first disappear; because, as they rise, they come in contact with water at a lower temperature. The sound made by their sudden formation and disappearance forms the singing of the kettle. When they rise to the surface, evidently the whole of the water in the flask or kettle is boiling.
Refer to rain disappearing from the streets, to ponds drying up.	In one case evaporation goes on slowly, in the other it is more rapid.
Boil a small amount of water in a flat evaporating dish, until the dish is dry. Let this water contain some matter in solution, so as to leave a sediment on the dish.	Solid matters contained in water may be obtained by evaporation.
Point out the "*still*" in the diagram. Note the boiler, the steam tube, the coiled tube or worm, and the issuing liquid.	The steam or vapour passing through the worm, which is surrounded by a tank of water, will be turned back again into a liquid. (Give the word condensed.)

OBSERVATION AND EXPERIMENT.	TRUTHS TAUGHT.
Refer to the similar appearances of the clouds from the kettle, the locomotive, and those in the sky.	They are all evidently of the same nature.
Again, question as to the nature of the mists over the river, in the valley, or on the hill. Note the fact that walking in such mists will make one wet and cold.	The cloud or mist collects on our skin or our clothes, and proves to be water.
Note in the diagram the sun shining over the sea. What will be the effect on the air and water beneath? How does this differ from heating the water in the kettle?	The sun turns some of the water into vapour, and at the same time warms the air. The warm air carries up the water vapour as it rises.
Suppose the warm, moisture-laden air is carried upward into a colder region; or suppose it strikes against the colder sides of hills. Call to the children's minds our experiment of bringing the cold glass into the warm air of the room.	A cloud will be formed of minute globules of water, and if the globules are very numerous, they might run together into larger drops, and fall down like rain-drops.
Which clouds depicted in the diagram are most like the steam from the locomotive? Describe their shape. Note that they are apparently flat based.	The clouds marked *cumulus* are very similar to the steam from the locomotive. They are white heaps of a rounded or woolpack form.
Refer again to the position of the *cirrus* clouds, and to their shape. When are they usually seen, and at what time of the day?	They look like light, fleecy tails. They betoken fine weather, and are usually seen towards the middle of the day.
Ask if the children have observed the appearance of the clouds towards sunset on a fine day, and early in the morning. Compare also their elevation in the sky with other clouds. (Give the meaning of the word *stratus*.)	These clouds form in layers, and are the lowest of all clouds. They are usually very near to the horizon.
Call attention to the heavy, dark cloud called *nimbus* in the diagram. From it we notice the rain is falling.	Evidently a dense cloud, holding much water, and ready to precipitate it on any sudden cooling.

Additional Information.—The children have perhaps heard of a *mackerel* sky, from the resemblance of the clouds to a shoal of fish. Such clouds are a combination of the *cirrus* with the *stratus*, and called *cirro-stratus*.

The *cirrus* clouds may be upwards of two miles high, while rain clouds may touch low hills. If, however, rain falls from clouds at a great height, the drops will be large, because they have more time to run together, and of course the only difference between a mist and a cloud is one of position—a cloud is an elevated mist. It is very interesting to trace the complete circulation of a drop of water on the earth. The sun draws it up from the sea in the form of vapour in the atmosphere. The vapour forms part of a cloud. The cloud impinges against the cold side of a hill, and the vapour is condensed and falls as rain. The rain runs down the side of the hill and is carried to a river, thence to the sea once more.

THE PRINCIPLES AND PRACTICE OF CLASS TEACHING.

HISTORY.

Why it should be Taught.

THE desire to know something of the past is probably as natural as the desire to know something about the future, and that may be taken as a very general desire indeed. So natural indeed is the wish to know the history of our race, that tribes which have no history have been under the necessity of inventing a history for themselves. Legend and myth take the place of written records. We are human, and nothing of human interest can be quite a matter of indifference to us. So we are apt to invent heroes to people the past, if we have no actual knowledge regarding actual heroes in that past. And if the mind be not stored with knowledge regarding the men of our own and other times whose lives ought to form subjects of interest for us—rather than have that vacuum which nature is said to abhor, we fill up the vacancy by taking an interest in the commonplace doings of our next-door neighbours. History of some kind we must have, to satisfy our natural craving.

The intellectual training which may be derived from a study of history is of the most valuable kind, though it cannot be obtained in all its fullness at the early period of school life. Yet even for children history has a unique value. Our pupils have their **imagination and sympathy excited** by the grand stories of the past. They are **trained to habits of reasoning and reflection** by watching the course of events, each leading to the other, and by tracing the development of our social life from stage to stage. And some degree of historical knowledge is necessary to the **understanding of the present conditions** under which we live, and even to the **understanding of the ordinary reading** of the least studious among us. References to other times and other places occur in all our newspapers and books, and to make this intelligible and interesting, a certain amount of historical as well as geographical knowledge is necessary.

As regards moral training, history has likewise a high value. There is no sermon, it has been well said, so impressive as the life of a good man. The teacher will do well, therefore, to make much of the great lives which his history lessons may bring before his class. The moral lessons lie on the surface, and require little or no direct exhortation to strengthen their force. The contemplation of a good example is more powerful than many precepts.

History has a very **direct bearing on practical life,** and thus has a value above studies which merely convey information. Information is not education. A teacher who sees it to be his work as an educator to aid nature in turning his boys into *men*, will find the study of history a valuable help. Those boys will in a very few years have the making or marring of their country in their own hands. The man who desires to cultivate and develop a plant must begin by learning something of the laws of its growth ; and those who have in their hands the development or the distortion of the growth of society and the state must necessarily learn first how the state has come to be what it is. Experiments based on mere opinion, unsupported by knowledge of the growth of the social organism, are always dangerous, and may be very injurious. History is the part of school work which has the most direct bearing on the **pupil's future conduct as a citizen,** and this fact lays a heavy responsibility on those who have to teach history.

History should not only be a preparation for the duties of citizenship ; it should also be the **foundation of an enlightened patriotism.** Patriotism is an old-fashioned virtue, perhaps, but it holds that place in national life which self-respect does in the life of the individual. The weakening of either is an accompaniment and a symptom, if not a contributing cause, of sure deterioration. The belief that our own country is the very best will do much to transform that idea into an actual fact ; while the *desire* to make it the very best, which is a more enlightened form of patriotism, is a still more powerful means to the same end. The teacher should keep this aspect of the subject well in view. If he does so, he will find enough in the past to serve as a stimulus for the future, not in the direction of military glory or of commercial and intellectual achievement alone, but, still better, of that righteousness which exalteth a nation.

> Thus much may well be aimed at in our school study of history. There is, of course, a vast field of higher study, in the antiquarian, political, and philosophical aspects of history, which lies quite beyond the pupil's scope. But these aspects also are of value to the teacher. The more profound, wide, and accurate his own knowledge is, the more simple, graphic, and effective will be his handling of the matter which his pupils have under their notice.

Early Lessons.

The early stages of history teaching correspond very much to the early stages of geography teaching. Children have the same difficulty in understanding distant times that they have in understanding distant places. In each case the first steps must aim at **awakening and directing the power of imagination.** That power is very strong in young children ; and if it is not directed so as to form right pictures, it will assuredly form wrong ones, which will long remain sources of erroneous thinking. Worse still, if no materials are supplied to the imagination, but only a mass of material to the memory, the subject will never become a means of education at all. There are few subjects which can be worse taught than history.

For the undeveloped mind, whether among uncivilised nations or among our younger pupils, history naturally takes the form of **story-telling.** The unlettered tribes have their legends of more than doubtful authority. We are better off in having at hand for our still unlettered youth a wealth of stories which are in all essential points true. But at first our history must be simply stories. This is the natural beginning of history.

> Chronology is quite out of place for young children. They have no more notion of a century than of a millennium. For the first two or three years, therefore, the teacher's aim should be to picture for them some definite portion of the past as it is revealed in the life of some great man, or in some famous event. The more romantic the better, for the sake of arousing interest. Everything depends on the teacher's power of making the pupils realise the scene, and for this purpose all kinds of historical pictures are valuable —portraits, pictures of buildings, of the dress and manners of the time, and the like. The point is to get the children to realise that *there have been other times than our own*, with more or less unlikeness to the time in which we live.
>
> The stories need not be all biography. Any picturesque and instructive event may serve as a lesson, and even a famous saying, such as, "Not Angles but angels," or "England expects every man to do his duty." The stories, again, need not be taken exclusively from our own history. Alfred the Great forms a good subject, but some teachers might find it interesting to take a lesson from some incident in the life of Alexander the Great, or Peter the Great, as a change. And at the first there is no necessity for taking up the selected stories in their chronological order. Chronology at this stage simply does not exist for children. A date is a number without a meaning. The scenes described happened "long ago," or "once upon a time," and that information is sufficient to satisfy any question which a young child will be likely to ask on that point.

Systematic Study of History.

When children reach the intermediate standards, they are usually expected to begin the systematic study of the history of their own country.

The common method has been to divide the nineteen centuries or so of British history into a series of periods, as marked off by the ruling dynasties, and **to study these periods in detail, taking them in chronological order.** The method is simple, and for an adult student it is the most natural one. It follows the fortunes of our country from stage to stage, and traces its growth in the natural order of development. But for children it has several drawbacks, not the least of which is the **loss of the sense** of

unity in the story. There is also a loss of the sense of perspective, both as regards time and importance of events. By the time the modern period is reached, the earlier periods are often forgotten. And even if they are revised from time to time, the revision is that of the history of definite periods rather than of a series of stages leading up to the present state of things.

The opposite method, the regressive, instead of the chronologically progressive, is sometimes advocated. It seems natural to begin with what is known, and work backwards to the less known and more remote. But to children the **present is not really known**, in the sense required for historical use. And it is very largely in order to make the present better known and understood that a history of the past is given. What is really known of the present can be as well used to illustrate and explain the unknown of the past as to explain the unknown of the present. And the distant period thus taught makes a natural starting-point for the next period, which depends on the former as cause on effect.

The Concentric System.

The method which seems best suited for school purposes is that known as the concentric system. According to this method, **the whole history of the country** is first gone over in outline, **the leading events only being referred to.** The characteristic or critical points receive all the attention of the class, and the subsidiary and intermediate events which are connected with these are left over for future study. Next year **the class goes over the same ground, but in more detail.** The important landmarks are now known, and form the centres round which a circle of less important but still great events is grouped. **Next year again the same plan is followed,** most of the time being spent on the fuller details and less prominent events, always, however, referred to those formerly known as the centres of the various periods. In this way the **unity of the history and the march of events are never lost sight** of in the details.

> The method may be compared to examining an object first with the naked eye; next with a magnifying-glass, which brings out fuller details; and finally with a microscope, which shows a still more complete network of connected details overlying the general features. The common method is to begin with the microscope, and examine one part of the object fully before proceeding to the next. But this study of minute structure is out of place until the general outlines and their relations have been grasped in a summary review.
>
> This plan is attended with the best results where it is adopted. There is a completeness about the knowledge from the first. Succeeding years of study are necessarily connected with the outlines already given, and so nothing is forgotten. Each year's course is dependent on the previous one, and explains it more fully. The sense of perspective is never lost, as the whole is always treated as a unity, and the significance of the important events becomes more and more fully understood in their relation to those subsidiary to them. Chronology becomes easier, as the new dates given have a distinct relation to those formerly learned; and in this way, when the date of a minor event is forgotten, it can be remembered *approximately* by the relation of that minor event to the major event with which it is connected in the pupil's mind. This method is likewise suited to the growth of the pupil's intelligence and insight, as all political and other details which require more mental power for their comprehension are naturally left over to the final course, and only the broad and graphic view of events is given in the earlier years. Thus the fact of the Norman Conquest, its general meaning, and its date, may be given at first. Next year, some reference may be added as to the leading persons concerned, and the course of events leading up to and resulting from it. But the aspect of the Conquest which bears on the language, laws, and habits of the people will not be referred to until the pupil is older and more able to understand such points.

The concentric system would seem to require at least three and perhaps four years' study to secure the best advantages. By the time a pupil has gone three or four times over the history of his country, each time with new light and interest instead of a mere rehearsal of previous work, he is likely to carry away with him a tolerably complete and connected view of the subject. The effect is very different from that produced by a study in detail of one portion after another during the same space of time.

The final year's work should be devoted to **a study of our present-day institutions, laws, and social and commercial relationships.** With such a connected study of the past as a groundwork, it will be comparatively easy to trace the growth of such institutions as our House of Commons through their various stages. There will be no difficulty in connecting one period with another, for they have never been presented otherwise than in connection.

Dates.

Chronology is a very important feature of all teaching of history, when that history takes a connected view of the development of a country. For the early stages, when the teacher is aiming only at getting his class to realise distant times and their characteristics, chronology is of no importance. But as soon as he begins the study of the history of our own country as a unity, chronology must be taken into account and treated systematically. **There is nothing to be said against the teaching of dates, unless the teacher mistakes the teaching of dates for the teaching of history.** He has to tell his class both *what* happened and *when* it happened; and although the *when* is much less important than the *what* for the development of intellect and character, still the *when* is an integral part of the *what*. And when the teacher proceeds to give the *how* or *why*, the explanation of causes, and the connection of one event with another, the question of the *when* becomes not only important but essential. In geography, the latitude of a country and the relative position of its physical features are important and essential to an understanding of its climate and productions, and consequently of its industries and other characteristics, if these are to be intelligently understood. So in history the dates which fix the time-relations of connected events are necessary to a complete understanding of these events in their relations. But it is the events, and not the dates remembered as isolated facts, which are important.

> For the intelligent use of chronology, charts which appeal to the eye are very useful, and, as in geography, these charts must be based on the idea of *scale*. For a general review of our history, the first chart may be an oblong, divided into equal sections representing the various centuries. This blank remains to be filled up, bit by bit; and as the various landmarks of each period are described, the names of the events are written down in their appropriate places in this table or chart. In this way the time-relations of the various events are fixed in the memory through the medium of the eye, and a more comprehensive view is taken of the whole than can be obtained by merely writing down the dates below each other as in the ordinary chronological lists.
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> For more detailed study in subsequent years, it will be necessary to take part of this general chart and reproduce it on a larger scale, so as to have only one or two of the century divisions before the class at once. The chart may then be divided vertically into columns, each column to be devoted to a certain class of event, such as military, legislative, social and industrial, and the like. But whatever section is being dealt with, the landmarks formerly taught are to be kept prominently in their original place, and the other events grouped round them. Nothing that was once learned is to be omitted; it is to be presented in new and more detailed relations. The first chart may be compared to the map of a continent, and the later ones to the maps of the individual countries in it: only the broad features find a place on the former; on the latter they still find a place, but they are surrounded with additional details.
>
> The names and dates of our successive kings have frequently been given a place in history teaching more prominent than their importance justifies. But the different reigns undoubtedly serve a good purpose in chronology. They are not too many to be remembered, and when remembered they serve as pegs on which to hang other events. The various centuries would serve the same end, but for the fact that a century is too long a period and contains too large a number of events. But the sequence of our sovereigns forms a useful time-framework into which we fit

the events of the various reigns, even when the connection between the sovereign and the event is merely one of time.

Chronology has thus an important place in the teaching of history; and it should be taught scientifically and systematically. But, it may be again repeated, chronology is not history; it is merely the measurement by which we get the distance of one event from another. In some cases this distance is of little importance, in others of great importance, to an understanding of the events themselves. But in no case can the mere time-relation serve instead of an understanding of the events and their significance.

Illustrations.

History is generally described as a difficult subject for children to understand; but its difficulty is by no means limited to children. It is a difficult subject for historians to understand. Only once or twice in the course of a century do we get a writer with the true historical insight who can interpret some bit of the past for us and make it living and real. But this is taking history in a different sense from that in which we speak of it as a school subject. The teacher has nothing to do with the real difficulties of the subject. His business is to accept the results of the historian, and convey to his class so much of them as is suited to their intelligence; and if he does this in a careful and skilful manner, the history lesson will be no more difficult to understand than any tale of fact or fiction which he may tell. In selecting a fairy tale, the teacher is careful to choose one suited to the intelligence of the class; and in selecting a historical tale, the same principle must be kept in view.

In older classes, where the work is more systematic, two main principles have to be faithfully adhered to:—1. **The events must be pictured out so as to be clearly set before the children's imagination.** This means something more than making it merely understood. It is in this particular that the individual teacher's power comes most into prominence. Some teachers seem unable to make an event real to the children, and it may be suspected that the reason for this is partly because it has never been real to the teacher. He must realise, visualise, and live in the period or event himself, before he can present it in the desired form to the class. 2. **Every means must be taken to secure the interest of the class in the subjects studied.** These two principles are inter-related. Whatever makes a scene more vivid and real makes it more interesting, and whatever arouses interest in the scene arouses in the class that degree of mental activity which is needed to make them feel its reality.

Abundant illustration is necessary both for the development of imagination and for the arousing of interest. These illustrations may be of the most varied type. **Pictures** are the most obviously useful—portraits of the men mentioned; pictures of places and of famous incidents; pictures showing the dress and occupations or amusements. **Short stories or anecdotes, or actual sayings of the persons,** are of use and interest. Abundant reference to any **events which happened in the children's own district** helps in the same way, and for this reason such events should be much more minutely discussed than their intrinsic importance would warrant. Teachers whose work lies near historical scenes, buildings, and monuments have an advantage in this matter. **The literature of a period** is helpful for a senior class, as a means of realising the life and the opinions of the people. It has, of course, a more important place, as being one of the aspects of the history to be studied; but apart from this, extracts may help in the clear conception of the period as a whole. **Historical ballads and songs** should be made use of for illustrative purposes, and in older classes **historical novels and plays.** Apart from classical works of this kind, teachers will find hundreds of scenes in the numerous works of fiction now issued for boys and girls which are true enough to the history of the period to be of use in giving "local colour." These stories show **how people spoke and acted at a certain period,** whether the actual persons named in the story ever lived or not. This kind of material is much brighter and more interesting than the more solid and classical novels, and should be found in abundance in every school library.

Other forms of illustration may suggest themselves to the thoughtful teacher, and the more varied they are the better. But illustration there must be. It is just from the want of sufficient illustration that history has been found difficult to teach. If the text-book or summary contains all that the children receive in the way of historical teaching, the subject would be better left out of the programme. The words of the book may indeed be remembered, and their meaning as mere words understood, but the force of the whole is never realised without the most careful treatment by the teacher in the way of illustrating and picturing forth the scenes mentioned. History from the text-book has much the same value as geography from the map. Each is a skeleton of dry bones, a framework into which the breath of life has not as yet been breathed; and without this breath of life they will not long remain even a framework—they will crumble into dust, and be forgotten.

ELEMENTARY LESSONS IN THE PRINCIPLES OF GRAMMAR.

A Course of Forty Oral Lessons for the First Year (New Code, Standard IV.)

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LESSON XIV.

PERFECT AND IMPERFECT ACTION.

We have now to consider the *state of an action* as proceeding or as finished. While a man is walking, we can assert, "The man is walking;" but if the walking is now finished, we should say, "The man has walked."

If an action is completed or finished, the verb by which this is stated is said to be Perfect. When a verb is used to denote continued action, the verb is said to be Imperfect. "Imperfect" means "not perfect."

An action may be completed or ended in the present, the past, or the future. The statement of this gives us a perfect form of the verb in each of the three tenses:—

I *have written* my letter now.
I *had written* my letter before you came yesterday.
I *shall have written* my letter by the time you come to-morrow.

1. The present perfect tense indicates the completion of action in the present:—

I have written.

2. The past perfect tense indicates the completion of action in the past:—

I had written.

3. The future perfect tense indicates the completion of action in the future:—

I shall have written.

We must not confuse "past" with "perfect." "Past" refers to *time*, "perfect" refers to *state of action*.

The verb "to have" is the verb used to indicate completed action.

Have.....Auxiliary verb of the present perfect tense.
Had.....Auxiliary verb of the past perfect tense.
Shall have...Auxiliary verb of the future perfect tense.

An action may be proceeding in the present, the past, or the future. The statement of this gives us an imperfect form of the verb in each of the three tenses:—

I *am writing* my letter now.
I *was writing* my letter before you came.
I *shall be writing* my letter to-morrow.

1. The present imperfect tense indicates an action proceeding or going on in the present:—

I am writing.

2. The past imperfect tense indicates an action proceeding in the past:—

I was writing.

3. The future imperfect tense indicates an action proceeding in the future:—

I shall be writing.

The verb "to be" is the verb used to indicate action as proceeding.

Am.....Auxiliary verb of the present imperfect tense.
Was.....Auxiliary verb of the past imperfect tense.
Shall be...Auxiliary verb of the future imperfect tense.

Each of the three main tenses of a verb has a perfect and an imperfect form. This gives nine primary or principal tenses:—

1. Three tenses to indicate time.
2. Three tenses to indicate time and completed action.
3. Three tenses to indicate time and progressive action.

The first three we may call the Simple Tenses.
The second three we may call the Perfect Tenses.
The third three we may call the Imperfect Tenses.
The Perfect Tenses are formed with the verb "to have."
The Imperfect Tenses are formed with the verb "to be."

MEMORY NOTES.

CONJUGATION OF THE VERB "TO SPEAK."

I.—Simple Tenses.

1. *Present.*

I speak.	We speak.
Thou speakest.	You speak.
He speaks.	They speak.

2. *Past.*

I spoke.	We spoke.
Thou spokest.	You spoke.
He spoke.	They spoke.

3. *Future.*

I shall speak.	We shall speak.
Thou wilt speak.	You will speak.
He will speak.	They will speak.

II.—Perfect Tenses.

1. *Present perfect.*

I have spoken.	We have spoken.
Thou hast spoken.	You have spoken.
He has spoken.	They have spoken.

2. *Past perfect.*

I had spoken.	We had spoken.
Thou hadst spoken.	You had spoken.
He had spoken.	They had spoken.

3. *Future perfect.*

I shall have spoken.	We shall have spoken.
Thou wilt have spoken.	You will have spoken.
He will have spoken.	They will have spoken.

III.—Imperfect Tenses.

1. *Present imperfect.*

I am speaking, etc.

2. *Past imperfect.*

I was speaking, etc.

3. *Future imperfect.*

I shall be speaking, etc.

These should all be written out in full and committed to memory.

LESSON XV.

AGREEMENT.

When two persons are of one opinion, they are said to agree. If a man says "yes," and his wife "no," there is no agreement; nor would there be agreement if both changed. If one remains unchanged, and the other changes to it, then there is agreement.

To patch a coat, a tailor seeks a piece of cloth that will *agree* in pattern and colour with the cloth of the coat.

Agreement, then, consists in one thing being like another.

When we name a thing and make an assertion about it, then both the name and the verb refer to the same subject.

A *horse is* an animal. Two *horses are* two animals. "Horse" and "is" are singular, because they refer to one thing as subject. "Horses" and "are" are plural, because the subject is more than one.

The verb, then, is singular or plural according as the subject is singular or plural. The name of the subject is singular or plural for the same reason.

Let us remember, "The verb agrees with the subject in number."

One dog barks. "Dog" is singular, because it names one only. The action of barking is therefore the action of one dog. Hence the word "barks" is singular number, agreeing with "dog."

Two dogs bark. "Dogs" is plural, because it names more than one dog. Hence "bark" is plural, because the action of barking is performed by more than one dog. One dog gives one action; two dogs two actions. "Bark" is a verb, plural number, agreeing with "dogs."

A verb is singular when the subject is singular, and plural when the subject is plural. The subject is fixed first, and the verb agrees with the subject. We may not say, "The subject agrees with the verb," but "The verb agrees with the subject."

A verb is also of the same person as the subject; for example,—

I am a boy.

"I" means the speaker, and is first person. "Am" is asserted of "I," the speaker, and therefore "am" is first person.

Thou art lazy.

"Thou" is second person, therefore "art" is second person.

He sings.

"He" is third person, therefore "sings" is third person.

The verb agrees with its subject in number and person.

We laugh.

"We" is plural number, first person; therefore "laugh" is plural number, first person, agreeing with "we."

Before we can say what number and person a verb is, we must find the number and person of the subject. The verb will then be like the subject in number and person.

By means of a verb a speaker makes an assertion concerning a subject. We may discover the subject by asking a question with "who" or "what" before the verb.

Tom runs. Who runs? Tom.

Tom is the subject, and is singular number, third person. Hence "runs" is singular number, third person, agreeing with Tom.

Pronouns are of separate forms to indicate person. This is the reason why the tenses of verbs are arranged with I, thou, he, we, you, they, in succession as subjects:—

I am .....Singular number, first person.
Thou art.....Singular number, second person.
He is.....Singular number, third person.
We are.....Plural number, first person.
You are.....Plural number, second person.
They are.....Plural number, third person.

Never say "I are" or "he are," but "I am" and "he is." In the past tense never say "you was" or "they was," but "you were" and "they were." If you break this rule you stamp yourself as being ignorant of your own language. A man who shows himself to be ignorant of his own language is very often considered to be ignorant of many other things he ought to know. In Suffolk many people say "he have" for "he has," and also use a wrong form for the third person of other verbs; as, "He *have* done his lessons," "The boy *sing* well," "She *do* work hard."

The first great rule of language is that the verb must agree with the subject in number and person.

MEMORY NOTES.

A verb is singular when the subject is singular; for example,—

He has an apple.

"Has" is singular number because "he" is singular number.

A verb is plural when the subject is plural; for example,—

They have a dog.

"Have" is plural because "they" is plural.

A verb is also of the same person as its subject.

The law of agreement or concord is:—

The verb must agree with its subject in number and person.

We write.

"We," plural number, first person. "Write," plural number, first person, agreeing with "we."

A New Departure in Publishing.—Under the general title of "The New Century Library," Messrs. Thomas Nelson and Sons are about to issue Pocket Editions of Standard Novels, printed on their "Royal" India paper. The issue will begin with monthly volumes of Charles Dickens's Novels, and the Works of Thackeray, Scott, etc., will follow in due course. The books will be printed in longprimer type, the size commonly used in library editions of standard fiction; but instead of the familiar bulky volumes, complete novels published in the New Century Library will measure only 4¼ by 6½ inches, and will be only half an inch thick. This great reduction in size is only rendered possible by the use of Messrs. Nelson's "Royal" India paper. The issue of this library is an entirely new departure, and the small India volumes will be welcomed alike for pocket and library use.

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

THE AWAKENING OF A NATION.

THE NEW JAPAN.

WHEN Julius Cæsar visited the shores of Britain in 55 B.C., he found little to prognosticate the rise of the great and glorious empire which exists to-day. Had he visited Japan at that time, he would have found a people who for six hundred years had been ruled by one unbroken dynasty, and who already possessed written records of their national life for several past centuries.

Through the intervening ages the Britain of to-day has been steadily built up; while Japan, with all its initial advantages, has stood almost, if not quite, stationary. Had they been bound down by religious traditions and national prejudices, of which an inborn and intense dislike of foreigners was a distinguishing feature, it would not have been a matter of surprise if ere now the great nations of the West had sought a footing in the "Britain of the Pacific."

The following are a few of the more notable landmarks in the history of Japan:—

Religion of Buddha introduced, A.D. 69.
Invaded by Mogul Tartars with an armada of 4,000 vessels and 240,000 men, 1284.
The Jesuits, under Francis Xavier, landed, 1549.
Visited by the English, 1612.
Thirty-seven thousand Christians put to death, 1612.
Combined fleets of the British, French, and Dutch forced a passage through the Strait of Simonosaki, 1864.
Japanese subjects permitted to go abroad, 1866.
First vessel officered and manned by Japanese arrived at Hong Kong, October 15, 1867.
Jeddo and Osaka opened by treaty, 1868.

Now Japan began to awake to its responsibilities as a nation, and the national public opinion underwent a complete revolution. There is no better authority on Eastern subjects than Sir Edwin Arnold, and this is his summary of the marvellous progress of Japan within the short space of twenty years:—

"New and enlightened criminal codes were enacted; the methods of judicial procedure were entirely changed; thoroughly efficient systems of police, of posts, of telegraphs, and of national education were organised; an army and navy, modelled after Western patterns, were placed on a sound basis; railways, roads, and harbours were constructed; an efficient mercantile marine sprang into existence; the jail system was radically improved; an extensive scheme of local self-government was put into operation; a competitive civil service was organised; the whole fiscal system was revised; an influential and widely-spread newspaper press grew up rapidly; the people were enfranchised, and government by Parliament was substituted for monarchical absolutism."

It was perhaps the war with China in 1894–95 that drew the public attention of the civilised world to Japan more than anything else, and it became patent to even the casual observer that Japan was hastening towards civilisation with an ardour and an impatience contrasting greatly with the lethargy of the past. The war ended disastrously for China, and this result doubtless added to the spirit of self-confidence which is a remarkable feature in the Japanese character.

Western onlookers cannot help admiring the ambitious aspirations of the Japanese, and applauding the large measure of success they have already achieved; but there is more or less danger in ill-regulated enthusiasm attempting to compass too much—it is possible to make haste too fast, even towards a desirable end. The Japanese are ingenious, and in artistic and decorative work they are highly successful; but there is a doubt whether they will ever succeed as a manufacturing people. It remains to be proved whether they possess the force, the grit, and the necessary pushful capacity to become entirely independent of outside assistance, at least for some generations to come.

A recent consular report says:—

"The year 1898 was marked by general financial depression. Scarcity of money was the complaint heard on all sides. The Government were at their wits' end to discover sources of revenue that would be acceptable to the Diet. The people had no available money, and enterprises started with sanguine expectation after the war languished or were abandoned. In Osaka two-thirds of the factories presented a deserted appearance. Moderately cheap working capital was a desideratum which it proved impossible to obtain."

Lord Charles Beresford visited Japan this year to gather information for the associated Chambers of Commerce. The following quotations* will be read with interest, and will

* *The Break-up of China*, by Lord Charles Beresford.

more than indirectly show how rapidly the country recovered:—

"On arriving at Nagasaki, January 11, 1899, I visited the large mercantile docks and works of the Mitsu Bishi Company. There are two yards, both under the direction of the same company. They employ 4,000 men. I found on the stocks a steamer building for the Japanese mercantile fleet—6,000 tons, 430 feet long, and 45 feet beam. I was much struck by the safety and capabilities of this vessel. All the tool steel and pig-iron at present come from Great Britain, as does all the coke that is used, and the boiler tubes and ingot steel.

"At Osaka I visited the military arsenal. It was principally employed making a new quick-firing gun—12 pounder, for horse and field artillery, Japanese patent. The principle was certainly second to none. Most of the machinery in this arsenal is British.

"I also visited the largest of the seventeen cotton mills at Osaka. All the machinery I saw was British, and I was told this was the case throughout all the mills. This mill employed 5,000 men, women, and children. There are thirty match factories at Osaka.

"At Kioto I went over the great electric plant worked by water-power, produced by a fall of 120 feet. This power supplies Kioto with two-thirds of the electric light, works the electric trams, the pumping for the water-works, and no less than sixty different industries in or near the town. All the machinery, which is excellent, is American. There is no country which I have visited where electricity as a motive power has been taken advantage of to the same extent as in Japan for the furtherance of trade and commerce."

Such progress as is indicated by the above borders upon the marvellous, but does not remove all the doubts we have expressed. For example, in discussing the watch trade, the leading native newspapers admit that ten American workmen can do more than seventy Japanese, and that Japanese labour at tenpence or a shilling per day is more expensive than American labour at twelve shillings. Consequently, there does not seem to be much reason to fear Japanese competition, in neutral markets at least.

In July last Japan entered upon a new era, for then the New Japan entered the ranks of civilised nations. Hitherto the great nations of the world had not allowed their subjects resident in the empire to be amenable to the jurisdiction of the native courts of justice, and the removal of this barrier will do much to bring the Japanese in closer touch with foreigners.

Until the end of August there were only six open ports—namely, Yokohama, Kobe, Osaka, Nagasaki, Hakodate, and Niigata. But a recent decree notified the opening of twenty-two more ports, which surely points to a large increase of foreign trade. British merchants ought to benefit very considerably, for Great Britain sends by far the largest share of merchandise to Japan.

Japan is now in a transition state, and though there are obvious difficulties in the way of Japan realising its ideal, it behoves us not to hold a young competitor too cheaply. It must be borne in mind that American competition was but a threat a few years ago—a threat the fulfilment of which British manufacturers have realised only too keenly.

The area of the Japanese Empire is about 147,000 square miles, and the population is not less than forty-five millions, or about 270 to the square mile—one of the densest populations on the face of the earth. Such a state of congestion has been reached that a large part of the inhabitants can find no occupation on the land, and must turn their attention to industrial occupations by which to earn the means of sustaining life. In the struggle for existence, large numbers of Japanese leave their native shores and sail for the Straits, for Australia, Western America, and any other country where no restrictions prevent their settling.

Although these genial little people are less obnoxious than the Chinese, they are already forming no inconsiderable part of the "yellow peril" which threatens to drive out white men from various occupations in certain quarters of the globe. So large is the influx of Japanese into British Columbia, that their employment on certain works is prohibited. In Vancouver, the squat little Jap is ousting the Canuck in the big coal-mines. Every year their numbers are swelled by thousands, and the Japanese Government are already requesting that their subjects be granted the franchise. Whether it is expedient to grant this is a matter of very considerable doubt.

"COMPOSITION THEMES AND MORAL TRAINING."

A SERIES OF LESSONS PREPARED ON A NEW PLAN FOR THE UPPER STANDARDS.

BY B. ELDERKIN,
Model School, Westminster College.

Hints for Successful Use of these Lessons.

(*a*) They are founded on the principle that the mind grows by what it feeds on. Composition, more than any other exercise, shows how far the learner has made the subject his own. The lessons are prepared with a view to supply motive and stimulus in the pursuit of virtue. Nothing is more helpful in this direction than *biography*.

(*b*) The subject matter may be *read* over by the teacher or by one of the scholars, or, better still, the teacher may previously read it, and give the substance to the class in his own words. He may thus at discretion introduce other illustrations, or omit some of those given.

(*c*) The whole of the essay should be put before the class at the first lesson; but it will often happen that there will be sufficient matter for two or more written exercises.

(*d*) It is not intended that these lessons should be used exclusively, but that they should form a part of every month's composition work.

LESSON XI.—"WHERE THERE'S A WILL THERE'S A WAY."

THE truth of this saying was never better shown than in the life of Thomas Edward, the Scotch cobbler and naturalist. He was born at Portsmouth on Christmas Day, 1814. His father was a private in the militia. After the battle of Waterloo his father's regiment was disbanded, and he returned to his native Scotland and settled at Aberdeen. Thomas Edward's early boyhood was thus spent at that place. How he came to be a naturalist he could never tell. It was born in him, and he himself says his desire to know all about living things "became, as life went on, an unconquerable passion."

Before he could creep out of doors, his first friends were the cat and the dog. As soon as he could toddle about, he made the acquaintance of his father's fowls; but they would never consent to become his playmates, as the cat and dog had done.

He formed a great fancy for a neighbour's sow and her young pigs, and he spent one whole night with them, though how he got into their "sty" was always a mystery. He had probably asked some one to lift him over the fence. As he was able to go further afield his acquaintances multiplied, and, to the terror of his mother, he seldom came home from his wanderings without some new "beastie" he had picked up on the way. He was coaxed, flogged, and imprisoned by turn, to prevent these "nuisances" being brought home, but all to no purpose. He could not go out of doors without finding out some new pet, and he as certainly brought it home with him, notwithstanding all promises to the contrary.

His School Days.

At four years of age it was a great relief to his mother to send him to school, but it was a sore experience for Master Tom. He was always in trouble between truanting in search of new pets and terrifying his schoolmates and teachers by taking them to school with him.

His first school was kept by an old lady; but what could she do with a pupil whose pockets were full of wonderful butterflies, which all his schoolmates wanted to see, or of horse-leeches from a neighbouring pond, which terrified them almost out of their wits? His favourite school at this time,

however, was the fishing quarters of the town; for there were fishes of all sorts and sizes to be seen, and their names learned from the fishermen's wives, and also some of the most wonderful bluebottles and other living creatures, drawn hither by the odour and refuse of the fish.

One day Tom overstepped the bounds of caution, and was expelled ignominiously from school. He had a favourite jackdaw, which was a constant companion; but it was so noisy his mother vowed its destruction, and Tom was greatly alarmed for his favourite. Between his mother and his schoolmistress Tom did not know how to choose. He decided to take the daw with him, and try concealment; so it was thrust into his wide knicker suit, and taken to school. All went well till the scholars knelt for prayers. The daw did not approve of being doubled up and half suffocated, and began at once a furious struggle for light and liberty. It managed to get out its head, when it set up loud screams such only as a jackdaw in a fright could make. The effect on the scholars may be imagined, but not that on the old lady. Tom was quickly shown to the door, and never allowed to return.

His next school was kept by a master, who succeeded in holding his ruling passion in check, so far as school was concerned, for some considerable time, and he made some little progress with his reading and counting. One morning, however, Tom found himself at the school door some half-hour before the time of opening, and the desire to stroll down to the burn, just to see how his old friends were getting on, was too strong to be resisted. Almost before he knew what he was doing, an old bottle was full of horse-leeches, which he intended taking home at the close of school. Slipping into his place, he put the bottle under his seat; but one of the leeches managed to get out, and was crawling up a scholar's leg. The sequel may be soon told. The boy screamed at the top of his voice: Master Tom was again sent home. His mother pleaded for his being taken back again; but the master said he would not have him for twenty pounds a year.

Tom's third and last school was kept by two masters; and the teacher to whom his education was entrusted, knowing his weakness, duly cautioned him of the chastisement that would follow any attempt to repeat such actions as had brought about his previous dismissals. All went well till one day, on his way to school, Tom saw a ladder against a spout in which he had watched day by day the progress of a sparrow's nest. He had many a time counted the cost of reaching that nest by way of the water-pipe, but to find a ladder put in the exact place was too much for him. To mount and secure the prize was the work of a few minutes. Eggs were what he hoped for; young birds were harder to conceal. Tom's cap was brought into requisition, and all went well till hunger compelled the fledglings to declare their whereabouts. Tom was forgiven when the whole truth was told, and this act of clemency kept him from disgrace for eighteen months.

One day, however, in the midst of lessons, the master was startled by a "beastie" crawling on his arm. He knocked it off, and called Tom to tell him what it was, and to ask why he had been "up to his old game once more." Tom declared it to be a "Maggie mony-feet," but he assured the master he did not bring it into the school. "It's a lie," shouted the enraged master, while Tom simply reasserted his innocence. The angry master ordered him to prepare for his flogging, first for lying and then for his breach of rule. Asked again and again for a confession, Tom simply repeated that he had told the whole truth and had nothing more to confess. He was therefore once more sent home, but this time with aching bones, and smarting under a sense of injustice. Tom refused to return, and in this he had the sympathy of his parents; so, at the age of six years, all thought of further schooling had to be abandoned.

In later years this failure in his education was one of the greatest obstacles to the pursuit of his favourite studies. Books which might have been of the utmost service to him, and saved him hours of painful toil, were comparatively useless, and writing was always an almost impossible task. He was once asked to deliver an address to the youths of a public school at Liverpool. His speech was full of wise counsel, but in relation to the value of education his words are worth repeating.

"Ah, my young friends," he said, "do, I entreat you, take solemn warning of an old man, and one who speaks from sad experience. Never neglect your learning, or any scholastic duties. Remember how bitterly I have had to suffer for this all my life. Of all my misfortunes put together—and they surely were many—the want of learning has vexed and grieved me most, and ever will do until I go hence."

Apprenticeship.

If Tom would not go to school, he must find some work. After two or three attempts he was apprenticed to a shoemaker. It was an unsuitable trade, but no other could be found; and, as might be expected, he fell out with his master over his favourite pursuits. One day his master, who was a drunken, worthless man, found Tom playing with a young sparrow which he had taught to do some funny tricks. He kicked Tom and trampled on his bird. This was more than he could bear; and as this conduct was repeated, they parted, and Tom did not complete his apprenticeship. He never allowed his passion for living things to interfere with his work, and so the master was wrong to interfere with his use of his leisure time. He tried hard to find other occupation, but as his efforts were not successful, he returned once more to his cobbling, and never again left it as long as he could work.

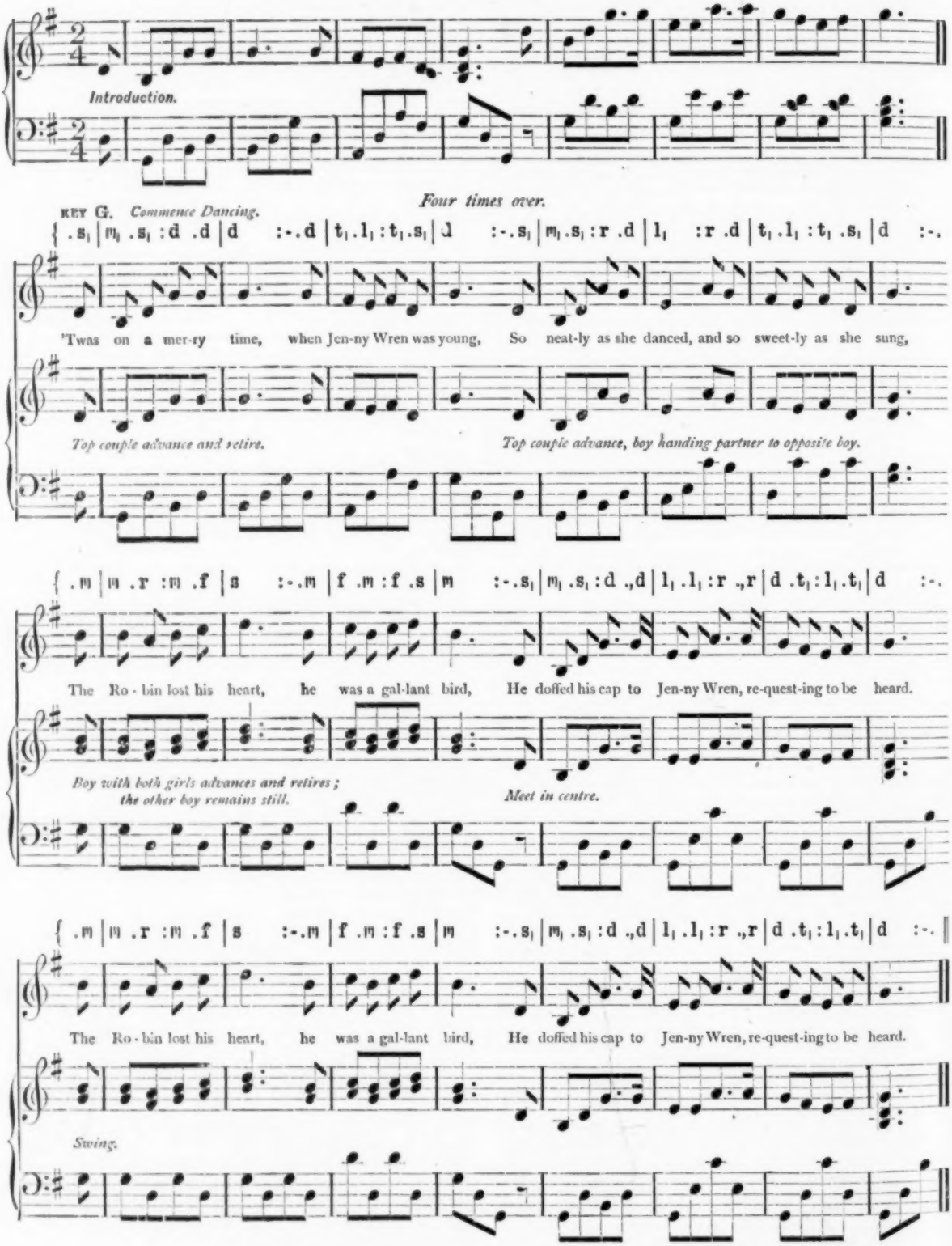
How his great Lifework was done.

His hours of business were from six in the morning to nine at night. Surely this was a long enough day to satisfy any ordinary mortal, but not so Edward. He determined he would know all there was to be learned about the natural history of his district, and nothing could resist him when his mind was made up. In summer, as soon as his day's work was done, he would equip himself for the night. His hat was divided off by partitions to hold his specimens. His coat and waistcoat were a mystery of pockets. In these were stored bottles and boxes ready for all sorts of occupants. His rickety old gun, a small bottle of chloroform to send his captives to sleep, and a few oatcakes completed his outfit; and thus night after night, for more than forty years, while his neighbours were resting or wasting their time and money over bad habits, he would set out in search of bird, beast, or plant for the enrichment of his collection.

As long as daylight lasted he would follow up his pursuit; then throwing himself down under bank, tree, or barn, he would snatch a short sleep until daylight allowed him to resume his search. Six o'clock would find him again at his stool ready for his day's work. The long winter evenings were spent in making cases, and in stuffing or preserving his specimens. By the time he was thirty years of age his collection numbered over two thousand specimens. More than once these had to be sold to defray the expense of a doctor, rendered necessary by the hard life he lived. An attempt to earn a living by exhibiting his collection in Aberdeen resulted in complete failure. He had to sell his specimens to free him from the debts it had brought upon him; but he always set to work to replace the lost treasures. One of the great obstacles to the success of his show was the difficulty he had in satisfying the public that the collections were the work of his own hands. How could a poor cobbler, with no leisure time, and without education, do such an astonishing task? He had one answer to all objections: "Where there's a will there's a way." "Any one who had the will power could have done the same."

Later Efforts.

With all his work he remained poor. Under the guidance of the local clergyman, he began to write for the scientific papers accounts of his wonderful discoveries. These brought him into connection with learned men all over the country. They would write to ask for information and for specimens, but it never seemed to occur to any of them that labours so great, and involving so much exposure and self-denial, could possibly require any money payment. Eventually, upon the advice of Lord Beaconsfield, Her Majesty the Queen conferred a Civil List pension upon him of fifty pounds a year; and thus his later years were spent in comparative ease and relief from all anxiety about daily bread. He died at the age of seventy-two—an example for all time of what can be done where there is the will to do it.

THE ROBIN AND THE WREN.

Introduction.
KEY G. Commence Dancing.
Four times over.
'Twas on a mer-ry time, when Jen-ny Wren was young, So neat-ly as she danced, and so sweet-ly as she sung,
Top couple advance and retire.
Top couple advance, boy handing partner to opposite boy.
The Ro - bin lost his heart, he was a gal-lant bird, He doffed his cap to Jen-ny Wren, re-quest-ing to be heard.
Boy with both girls advances and retires; the other boy remains still.
Meet in centre.
The Ro - bin lost his heart, he was a gal-lant bird, He doffed his cap to Jen-ny Wren, re-quest-ing to be heard.
Swing.

THE ROBIN AND THE WREN.

'TWAS on a merry time, when Jenny Wren was young,
So neatly as she danced, and so sweetly as she sung,
The Robin lost his heart—he was a gallant bird—
He doffed his cap to Jenny Wren, requesting to be heard.
The Robin lost his heart—he was a gallant bird—
He doffed his cap to Jenny Wren, requesting to be heard.

"My dearest Jenny Wren, if you will but be mine,
You'll dine on cherry pie, and you'll drink nice currant wine;
I'll dress you like a goldfinch, or like a peacock gay;
So if you'll have me, Jenny dear, let us appoint the day.
I'll dress you like a goldfinch, or like a peacock gay;
So if you'll have me, Jenny dear, let us appoint the day."

She blushed behind her fan, and thus declared her mind:—
"Just make it when you please—you are very, very kind;
For cherry pie is good, and so is currant wine,
But I will wear my own grey gown, and never dress too fine.
For cherry pie is good, and so is currant wine,
But I will wear my own grey gown, and never dress too fine."

The Robin got up early, all at the dawn of day;
He flew to Jenny Wren's, and he sang a roundelay,—
He sang of Robin Redbreast, and pretty Jenny Wren;
And when he came unto the end, he just began again.
He sang of Robin Redbreast, and pretty Jenny Wren;
And when he came unto the end, he just began again.

CLASS LESSONS IN DOMESTIC ECONOMY.

BY ETHEL R. LUSH,

Author of "Chats with Children on Domestic Economy," etc.; late Organising Mistress to the Ipswich School Board, and Head-Mistress of the Ipswich Higher-Grade Girls' School.

STANDARD V.

Lesson XXV.

THE SKIN AND PERSONAL CLEANLINESS.

THAT cleanliness and health are closely connected, no one will attempt to deny. Let us try to understand wherein the connection lies.

When we speak of *personal cleanliness*, we mean the cleanliness of the skin, hair, teeth, and nails; and though the other parts must on no account be neglected, it is the cleanliness of the skin which plays the most important part in the preservation of health.

A knowledge of the *structure of the skin* will help you to appreciate this.

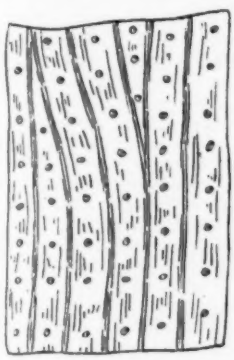


FIG. 1.—SURFACE OF SKIN MAGNIFIED, SHOWING PORES.

The skin forms a covering for the whole of the body. If we examine a small piece of skin under the microscope, we find that it divides naturally into two parts, differing clearly from each other. The upper part consists of hard, flat, horny scales, which are constantly rubbing off from the surface and being replaced by those from below. When you draw off your stockings at night, you may notice the tiny white scales which have been rubbed off during the day, and which consist of masses of the scale-like cells seen under the microscope; and if you scrape the skin of your arm with your finger-nail, you have no difficulty in raising similar scales. This upper layer is sometimes called the scarf-skin, but more properly the *epidermis* (Gr. *epi*, upon; *derma*, the skin).

In some parts of the body the epidermis is much thicker than in others, notably in the palms of the hands and the soles of the feet, the object of the thickening being to protect parts which are often brought into contact with hard surfaces. You have probably noticed that the palms of a man who does rough work with his hands are hard and horny; and children who run about barefooted quickly acquire a leathery thickening of the sole of the foot.

The epidermis is quite without nerves or blood-vessels. To prove this, take up the thinnest piece of skin possible on the point of a needle: so long as you do not penetrate the true skin beneath, you will neither feel pain nor draw blood.

We have already seen that the epidermis is made up of flat, hard scales which serve to protect the delicate skin beneath, and that it contains neither nerves nor blood-vessels. If we examine the surface of the skin under the microscope, or by the aid of a powerful magnifying glass, we shall find that it is pierced with innumerable little holes. What these are we shall learn presently.

You are familiar with the difference which exists in the colour of the skin, even among white people—some being described as of a fair complexion, others dark; and this difference is much more marked in the various races which people the globe. The negro has a skin so dark as to be called black, the Hindoo is scarcely less dark, and the Mongolian is yellow in hue. The secret of this difference in colour is to be found, not on the surface of the skin, as you might think, but just underneath, in the deeper layers of the epidermis, where cells of colouring matter, called *pigment cells*, are found.

Beneath the epidermis, and immediately under the pigment cells, lies the true skin, or *dermis*. You will understand its somewhat complicated structure better by the help of a diagram, and presently you shall verify the drawing by examining a section of skin under the microscope.

The line at the top of the diagram represents the surface of the skin; the part marked *a* is the epidermis; underneath this lie the pigment cells (*b*), and below these we find the true skin or dermis (*c*).

The upper part of the dermis is drawn up into finger-like projections (*d*), which are in reality the ends of nerves. It is to the presence of these nerve-endings that we owe the sense of touch which exists in the skin.

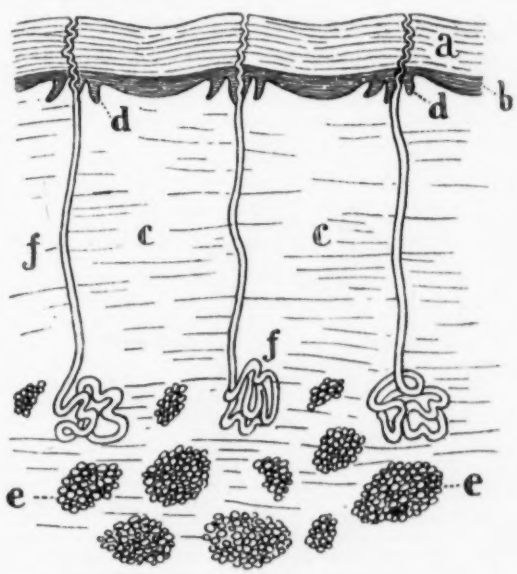


FIG. 2.—DIAGRAM SHOWING STRUCTURE OF SKIN.

Nerves are more abundant in some parts of the skin than in others; the tips of the fingers and the tip of the tongue are specially favoured in this respect. To prove this, take

a pair of dividers or compasses; put the points as close together as you can without making them actually touch. Press the points against the skin of your arm, and you will be conscious of one impression only; but touch the tip of your tongue with them, and you will easily detect the two points.

In the lower part of the skin are *fat-cells* (*e*). These give roundness and plumpness to the body, and serve, too, to keep the body warm, for fat is a bad conductor of heat. Animals inhabiting cold regions are provided with an extra number of fat-cells, forming a substantial layer under the skin. A very good example is found in the blubber of the whale.

You will remember that the epidermis is pierced by little holes or pores. If we trace the course of one of these pores, we find it to be the mouth or opening of a tiny tube or gland, which takes its way in corkscrew fashion downwards through the epidermis; then, straightening out, it passes to the lower part of the dermis, and here coils up into a ball, something after the fashion of a ball of worsted. Mixed with the coiled tube we find innumerable tiny blood-vessels, which give a red colour to the ball. These tubes or glands are the *sweat glands* (*f*), or, to use a longer name, the *sudoriparous glands*. As their name tells, they are concerned in the production of sweat or perspiration, and this is how they work:—

During its passage through the body the blood receives so many impurities that one organ alone is not sufficient to do the work of purification, and, among others, the skin, by means of its sweat glands, is called upon to take part in the great work. So closely associated are the blood-vessels and the glands that it is a simple matter for the impurities to pass from the blood, through the thin walls of capillary and gland, into the sweat gland. The impurities thus separated form the perspiration, which passes onwards through the tiny tubes until it is poured finally on to the surface of the skin.

Now we see the great reason for keeping the skin clean. So long as the pores are open, there is no obstruction to the free outpouring of the sweat; but if the mouth of the gland is clogged with dirt, the sweat cannot escape, the gland ceases to act, the blood is not purified, and the general health is impaired.

There is still another set of glands to be found in the dermis, known as the oil or *sebaceous glands* (Fig. 3). The skin in health is moist and supple: how is this condition maintained? If you dip your hands in water, it will stand in drops on the surface, just as it does on a greasy plate, and the application of soap is necessary to induce it to mix freely with the dirt on the skin. This points to the fact that the skin is supplied with oil of some kind; and on examination we find that there is an oil-secreting gland associated with each of the numerous hairs of the skin. If the supply of oil falls short, the skin becomes hard and dry, and in extreme cases cracks and becomes "chapped."

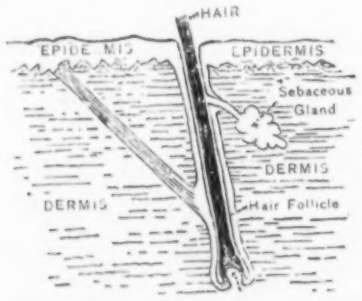


Fig. 3.

A glance at Fig. 3 will enable you to make out the position of an oil gland. The hair is shown encased in a recess or follicle; its root is covered with a sheath, which you may examine at your leisure by pulling a hair from your head. Hairs are found all over the surface of the body, except on the palms of the hand and the soles of the feet. Their number varies greatly, however, with the individual.

Just a word about the nails. Are you surprised to find that nails are simply a thickening of the epidermis—the hard scales made harder? They are, as you know, without either nerves or blood-vessels, for you cut them without pain or bloodshed. If you think of their position, you will see their use, for the nails form a protective covering to the delicate, sensitive finger-tips. A finger pinched in a door, or a nail cut below the quick, demonstrates very effectively how tender the tips of the fingers are, and how much they stand in need of protection. The toes, too, are supplied with nails for the same reason.

We have touched incidentally upon most of the functions or uses of the skin. Thus we have seen that the epidermis acts as a protective covering to the delicate dermis; that the true skin is the organ of touch, by means of its nerves; that the glands of the skin separate impurities from the blood and excrete them from the body; and that the fat-cells of the skin serve to keep in the heat of the body. There is one more use of the skin of which we have not yet spoken: it helps to regulate the temperature of the body.

When the weather is cold, the small blood-vessels of the skin contract, and thus reduce the supply of blood to the surface. In this way a smaller amount of blood is exposed to the chilling influence of the air, and the temperature of the body does not suffer.

In warm weather, on the other hand, or when the body is heated by exercise, the blood-vessels dilate, and allow a larger amount of blood to come to the surface to be cooled. It may seem strange to you that the blood is cooled even though the air be warm: this is how it is done. With the extra rush of blood there is an increased amount of perspiration poured on to the surface of the skin, and there it stands in beads or drops until evaporation takes place; and as evaporation is always attended by a reduction of temperature, the body is thereby cooled. If you wish to prove this statement, pour a little eau-de-Cologne or ether over your hands, and note how quickly it evaporates, and how it chills your skin. You may notice the same thing, in a lesser degree, by dipping your hands in cold water and letting them dry in the air. The excretion and evaporation of perspiration are always going on, generally without your knowledge, so that the skin is constantly acting as a cooling agent.

It is of interest to know what the various matters are that make up the perspiration. Water is, of course, the principal constituent; common salt is present in considerable amount; and in addition to these are sundry other salts and a little carbonic acid gas in solution.

Summary.

Structure of the Skin.

The skin is made up of two parts—epidermis and dermis.

The *epidermis* is composed of hard, flat cells. It contains the pores, but neither nerves nor blood-vessels.

The *dermis* is made up of soft, round cells, and contains pigment cells, nerves, blood-vessels, sweat glands, oil glands, and fat-cells.

A *sweat gland* is a tube or duct leading from a pore to the lower part of the skin, where it coils into a ball, and is associated with blood-vessels.

Oil glands are found in connection with the hairs of the skin.

Nails and hairs are outgrowths of the epidermis.

Uses of the Skin:—

1. To protect the more delicate underlying parts.
2. To serve as the organ of touch.
3. To keep in the heat of the body by means of fat-cells.
4. To regulate the temperature of the body.
5. To secrete perspiration from the blood, and excrete it from the body.

Composition of perspiration—water, common salt, other salts, carbonic acid gas in solution.

See THE PRACTICAL TEACHER'S ART MONTHLY for ANIMAL STUDIES FOR SCHOOLS. New Schemes of Drawing appear Monthly.

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THE INSPECTOR'S NOTEBOOK.

BY AN INSPECTOR OF SCHOOLS.

THE CLASS SUBJECTS.

There is too much Oral Teaching. HAVING dealt more or less fully with the three elementary subjects, we will now consider the class subjects. Before dealing with these in detail, a few general hints will perhaps be useful. The chief fault to be found is that there is too much oral teaching, and this is especially the case in the upper standards. Whilst in the lessons in the elementary subjects the scholars themselves are kept pretty busy, in the class subject lessons the teacher does most of the work. Thus too great a tax is put upon the teacher's voice, and we too frequently find throat disease as a result. It is true that this is brought about by an unskilful as well as by an excessive use of the vocal organs. In the first place, we may be quite sure that the actual oral teaching can safely be diminished. With the little ones, who need employment more than thought, incessant lecturing produces restlessness and inattention.

* * * * * *

Practice Lessons should follow the Oral Lessons. The oral lessons should be short and frequent, especially in the lower standards. A practical elementary science, of course, is an exception to this rule. As a rule, ninety minutes per week is given to each class subject. For the purposes of these notes we will, of course, not consider needlework as a class subject. Now, this can profitably be divided into at least three lessons of thirty minutes each, or perhaps four lessons—namely, three lessons of twenty minutes' duration each, and one of half an hour. Personally, I have found this division work better than, say, two lessons only per week of three-quarters of an hour's duration each. Too much at present is done for the scholar by the teacher. "The teacher should not perform the office of a text-book." The oral lessons should be used to supplement work done by the scholars, especially with the upper standard children, for whom suitable text-books should be provided. Upon this point I commend to your notice the wise counsel of ex-Chief Inspector Mr. Sharpe, who in his last report says: "They [oral lessons] should be followed by a number of practice lessons, making less demand upon the teacher's voice, and more profitable to the scholars; in most cases they should be followed by composition and reading and conversational lessons, until the subject becomes thoroughly familiarised. Thus an oral lesson on English grammar, which has for its purpose the establishment by inductive processes of the idea and function of an adjective, should be followed by several practice lessons, such as filling up blanks in sentences on the blackboard with appropriate adjectives, or a conversational lesson with a similar aim, or in a reading lesson calling attention to the function of the adjectives employed. Science teaching is, of course, largely an exception to these rules: the oral lesson must play the principal part; no text-book, however good, can provide for all the emergencies of the experimental lesson. But here again composition and conversational lessons may be utilised for a subsequent description of the experiments performed, and of their purposes and results; and very interesting reading books in science are published, suggesting to the scholars such experiments as are within their reach."

* * * * * *

Allow the Children Time for Private Study. It is important to train the children to acquire knowledge for themselves. Set aside some time for private reading. Begin in the lower standards with silent reading, and this will pave the way for the private study of the class and specific subjects in the upper standards. Combine the subjects wherever possible. History and geography may be thus treated. So may composition, English grammar, and recitation.

* * * * * *

Geography. The most popular class subject is geography. Every school should be supplied with a few good standard works on this subject, from which the teachers might obtain fresh and correct information. Stanford's books are worth having. None but the very best reading books should be bought for the children. Knowledge of newspaper geography is much more valuable than it used to be. THE PRACTICAL TEACHER meets this demand by its monthly column, "Our Illustrated Geographical Notebook." Other school periodicals also give useful information of this kind—for example, *The Scholars' Own*. At the present time, for instance, the children should be well up in the geography of the Transvaal, even though the course taken only includes *British* South Africa. I have recently found a class supposed to be *au fait* on South Africa, but which had never heard of Krüger. The teacher's reason was that the Transvaal was not British territory. That is an instance of being Code-bound with a vengeance.

* * * * * *

Teach through the Concrete where possible. In the good schools, geography is now graphically taught. Teaching through the concrete should be adopted whenever possible. Sand-trays are used to illustrate the definitions. The elder children should possess atlases of their own. The best maps should be procured. Nelson's roll-maps I consider excellent. Every school should have a first-class map of the world, with the British possessions clearly indicated thereon. The blackboard is not used sufficiently for sketching maps. It is a good practice to let the children of the upper standards fill in roughly on their slates a sketch-map of the portion being studied during a lesson.

* * * * * *

A few Notes on the Standard I. Course. Coming now to details, we will start with Standard I. course. My experience is that this course is usually considered the most difficult one of all. Certainly Standard I. geography is rarely so well done as that of the other standards. It takes a clever teacher to make the course interesting, I admit. By making a special effort in the way of preparation, I feel certain the difficulties of teaching this standard may be overcome. Let us take the compass. I have even found schools where there are enough of these instruments for each child in the class to have one. In any case, one real compass is necessary. Do not be content with a model of one. Let each child see how it acts, and observe that the needle always points in the same direction. Demonstrate this clearly by drawing chalk lines on the floor. Try to work persistently upon the principle of getting the children to find out for themselves. Teach them to observe the direction of the wind. But the bugbear of this course is supposed to be "a plan of the school and playground." Begin by demonstrating the difference between a plan and a picture. This can only be done by placing before the class actual pictures and plans of objects. There are some good charts published showing the picture of an object, with the plan of the same object in juxtaposition. The teacher should next proceed to take actual objects, such as a book, a penny, the blackboard, etc., and sketch plans of these on the blackboard. Plenty of time should be spent over these preliminary lessons. Subsequently the actual room in use should be taken and a plan drawn. The children should not be taught by rote a definition of a plan. They must clearly understand which part of the room it is that is represented in the plan. Very few recognise that it is the floor bounded by the walls. The furniture *on* the floor is also included, but not the pictures on the walls. Why? Later on the teacher should show what the plan of a room tells them about the room. A plan of the school and playground should now be used. Let the children have rulers, and actually measure such objects as their books and desks, before dealing with the difficult question of scale.

ANSWERS TO CORRESPONDENTS.

J. D.—I fancy you must have made a mistake in copying the sum you sent me. You did not send your address and an envelope, or I could have communicated with you. Send me another copy, and I will solve it.

Mistress.—There is nothing to prevent the transfer of infants at any time during the year, providing the reasons for so doing are legitimate. I do not advise you to do this, however, near the end of the school year.

Delta.—All you now want is a pass in Geometrical Drawing, Section I., Science Subject I.

Correspondence should be addressed "Inspector, care of the Editor, 33 Paternoster Row, London." In cases of urgency, an addressed envelope and two stamps should be sent.

A NEW AND SIMPLE METHOD OF PROVING QUESTIONS IN ARITHMETIC.

FOR TEACHERS AND STUDENTS.

Introduction.

IN the following papers it is intended to set forth a simple, quick, and reliable method of proving the correctness of most kinds of numerical calculations. The *principle* is not a new one, being the same as that of "casting out the nines;" but I shall try to show—I hope with success—that its use is of much wider extent than has yet been represented for that method of proof, and, further, that the objections pertaining to the use of the number nine are removed by employing the figure eleven.

Examples are given to illustrate the application of *number-casting* to arithmetical questions, commencing, as in arithmetic, with the simple rules, and advancing to more difficult ones. My aim is to treat the subject in full, although I would by no means assert that it is *expedient* to employ the method in every case to which it has been shown to be applicable. For instance, it will not be found better than the usual tests in addition and subtraction; but it will prove most useful to test questions in multiplication and division (both simple, compound, and with decimals), reduction, practice, etc., and the more so if the numbers employed are large.

The method is simple enough to be comprehended by those who have grasped the first four simple rules of arithmetic, and might then perhaps be shown to and used by pupils at each successive stage in the subject of arithmetic. It will, I trust, be of much service to candidates at examinations, as a means of proving rapidly the accuracy of their figures; but the method is of so practical a nature that those in business and offices, as well as teachers, will find it useful as a ready and reliable means of proving the correctness of their calculations.

The "casting out of the nines" is used as a means of testing the accuracy of some of the processes of calculation, such as multiplication. Nine is the number usually employed, but other numbers may also be used. It is our intention to show a more extended application of number-casting than is given in works on arithmetic. In proceeding to show the method employed, we shall, however, make use of the number

Eleven;

because, by a device which will have first to be explained, it can be very easily applied to the purpose, and because there are certain objections to the use of the number nine which do not apply to eleven. The explanation of number-casting itself begins at addition.

A Property of the Number Eleven.

The device above referred to depends on the fact that any number is divisible by 11, if the difference between the sum of the figures in the *odd* and in the *even* places be 0, or be divisible by 11. Let this be tested by any numbers, as 44, 495, 7326, 849324, etc., and it will be found that this rule is true in each case.

The *reason* of this will be apparent if the multiplication of any number by 11 be exhibited in full, as:—

Example 1.		Example 2.
71354		31572
11		11
71354	(1st line)	31572
71354	(2nd line)	31572
784894		347292

In Example 1 it is evident that the figures of the first line are repeated in the second line, but in the alternate places, so that the sum of the figures in the odd and in the even places is the same.

In Example 2 there appears a difference of 11, for

$$(9 + 7 + 3) - (2 + 2 + 4) = 19 - 8 = 11.$$

This arises from the addition of 7 and 5, which is equal to 12; but 2 only is put down in the answer. Hence there is a diminution of the figures in the odd places by 10, and 1 is carried forward and added to those in the even places, which altogether makes a difference of 11.

This peculiarity of numbers divisible by 11 may also be usefully employed, in number-casting, to find the *remainder*, after dividing by 11, in the case of numbers of which 11 is not a factor, without having to go through the process of division. For instance, the numbers

(1) 3645, (2) 105287, (3) 27530895,

when divided by 11, leave remainders of 4, 6, and 7 respectively.

We obtain, in (1), the same remainder 4 if we subtract the sum of the figures (4, 3) in the *even* places from that of the figures (5, 6) in the *odd* places, counting places from right to left.

In (2), 7 + 2 make 9, and 8 + 5 + 1 make 14. Since 14 cannot be subtracted from 9, we must either add 11 to 9 before subtracting, or take 11 from 14, and then subtract 3 from 9. In either case the remainder is 6; but the latter way shows that we may discard or *cast out* elevens as we go along, when we wish to know only the remainder.

In (3), the sum of 9 + 0 + 5 + 2 equals 16, which, casting out 11, leaves 5 as a remainder from the figures in the *even* places. Also the sum of 5 + 8 + 3 + 7 of the figures in the *odd* places equals 23, which, casting out *one* eleven, leaves 12. Then take 5 from 12, and the remainder is 7—the same as if the number itself had been divided by 11. Observe that 11, and not 22, is here taken from 23, since the latter would have left a remainder less than the 5.

The *simplest* way, however, is to find first the remainder from the numbers in the *even* places, which in Example (3) is 5, subtract this remainder from 11, and carry on the figure thus obtained (in this case 6) to the figures of the *odd* places; and then the figure left, after their sum has been divided by 11, is the final remainder. In this example (3) it will be found to be 7. This plan should be adopted, since it saves keeping another figure in mind.

Simple Addition.

Having stated this peculiarity of the number 11, we now proceed to show the application of eleven-casting itself to test the correctness of results in simple addition. In order to make the explanation as clear and simple as possible, we shall give a few examples worked out, leaving a statement of the principles upon which number-casting depends to a later paper.

It should be clearly understood that the device already explained, and used throughout these articles, for finding the remainder after division by 11, takes the place of and saves *direct* division by that number. Example:—

82734
16365
54919
46871
58306
259195

To apply the method of proof to the above example, first find the sum of the figures in the *even* places, casting out 11, or multiples of 11, whenever it is convenient to do so. Proceed thus:—

7 + 1 = 8, 8 + 6 = 14, 14 + 3 = 17, 17 + 8 = 25. Here cast out 22 from 25, and carry on 3: 3 + 6 + 4 + 6 + 2 = 21; and, casting out 11, there is 10 of a remainder. Subtract this from 11, leaving 1 to be carried to the figures in the odd places. Now treat the figures in the *odd* places in the same way, and we have, carrying on the 1 from the figures of the even places—

1 + 6 + 1 + 9 + 5 + 4 + 3 + 8 = 37. Cast out 33, and carry on 4: 4 + 9 + 3 + 7 = 23; of which 22 may be cast out, and the next row of odd places commenced, 1 being carried on: 1 + 5 + 4 + 5 + 1 + 8 = 24; and, casting out 22, the final remainder is **2**.

Next try the figures of the answer in the same way, and we obtain—

9 + 9 + 2 = 20; and, discarding 11, the remainder is 9. 11 − 9 = 2, which, however, might have been got by one operation of subtracting 20 from the next highest multiple of 11—that is, from 22. Then 2 + 5 + 1 + 5 = 13, which, after casting out 11, leaves **2**, the same as the final remainder obtained above.

Since these two remainders are the same, the answer to the sum may be considered correct. If they had not been the same, there *must* have been an error in the sum.

Simple Subtraction.

Example :—

5827316
2418739
3408577

First cast the elevens out of the top row, as before, and we have 5 over from the figures in the even places, and therefore carry 6 to those of the odd places.

6 + 6 + 3 + 2 + 5, which is equal to 22, and the remainder is 0.

From the second row the remainder is 4, and from the answer it is **7.**

Then the remainders are respectively 0, 4, 7.

Since 4 cannot be subtracted from 0, we borrow 11, on the same principle as 10 is borrowed in the ordinary method of subtraction, so that we have

$$11 - 4 = \mathbf{7},$$

the same remainder as that found from the answer, which is the test of correctness.

Simple Multiplication.

Examples :—

1.	2.	3.
2785	681	57486
498	264	41
22280	2724	57486
25065	4086	229944
11140	1362	2356926
1386930	179784	

Apply the test of eleven-casting to Example 1. The multiplicand, 2785, yields a remainder of 2, and the multiplier, 498, a remainder of 3. Multiply these remainders together (2 × 3) and the result is **6**, which is our final remainder.

From the product, 1386930, there is a remainder, after casting out the elevens, of **6**, which corresponds with the final number left from the multiplicand and multiplier. Hence the answer may be considered correct.

The other examples (2 and 3) should be tested in the same way, and are introduced as requiring special notice.

In Example 2, since 264 is a multiple of 11, there is no remainder after casting out the elevens. The multiplicand need not therefore be taken into account at all, since whatever remainder it may yield will be multiplied by 0, and the final remainder must be **0** also. Looking, then, only to the product, 179784, it is found that the remainder from it is **0**; just what is to be expected if the numbers have been correctly multiplied.

A similar result takes place in Example 3; but there it is the multiplicand, and not the multiplier, which is a multiple of 11.

Hence when the multiplicand or the multiplier is 11, or a multiple of 11, the remainder after number-casting in the case of the product must also be 0.

Simple Division.

Examples :—

1.	2.	3.
498)1386930(2785	264)179784(681	41)2356926(57486
996	1584	205
3909	2138	306
3486	2112	287
4233	264	199
3984	264	164
2490		352
2490		328
		246
		246

The examples here given correspond with those given under simple multiplication. This has been arranged for the sake of making the explanation of the method of number-casting under division shorter and more simple.

It is best to treat questions in *division* as if they were those of multiplication, in which the product of the divisor and the quotient ought to be equal to the dividend. Hence, in applying the test of eleven-casting to the examples given above, the directions under simple multiplication apply to them exactly.

It should be particularly noticed that in Example 2 the divisor is a multiple of 11, which, after casting out the elevens, leaves a remainder **0**. The dividend also produces the same remainder **0**; and therefore the final remainders will be 0, *whatever the quotient may be.* In such a case the division question must either have *no* remainder, or the remainder may be 11, or a multiple of 11, if the work is correct.

The same remarks apply to Example **3**; but it is the quotient instead of the divisor which is a multiple of 11.

To make a full test in the case where the *divisor* contains 11 as a factor, the factor 11 should first be removed both from the divisor and the dividefid, and then the test of eleven-casting applied to the result in the usual way. This will check a mistake that may have occurred by a wrong figure being inadvertently put down in the quotient.

Division with a Remainder.

Examples :—

1.	2.
135)1068743(7916	638)3685471(5776
945	3190
1237	4954
1215	4466
224	4887
135	4466
893	4211
810	3828
rem. = 83	rem. = 383

In order to prevent confusion, it will be necessary now to distinguish between the ordinary remainder of a question in division, as in the above examples, and the remainder after the process of number-casting. We shall now use the name number-casting remainder, or N.C. rem., for the latter.

Applying the test to Example 1, we first cast out the elevens from the divisor and the quotient, getting from these respectively the N.C. rems. 3 and 7. These are multiplied together and the elevens cast out, which gives a final N.C. rem. **10.**

Now cast out the elevens from the dividend, and also from the remainder, 83, and it is found that the N.C. rems. are respectively 5 and 6. The 6 thus obtained has to be *subtracted* from 5, the N.C. rem. of the dividend; and in order to do so, 11 has to be borrowed, when the result is

$$(5 + 11) - 6 = \mathbf{10}.$$

It will be seen that this N.C. rem. **10** corresponds with the N.C. rem. got from the divisor and quotient, and therefore the question may be considered correctly worked.

In Example 2, the divisor 638 yields a N.C. rem. 0, so that the final N.C. rem. from the divisor and quotient must be **0** too, which shows that the quotient in such a case need not be taken into account.

The dividend, and the remainder 383, each give a N.C. rem. 9, which on subtraction leaves a final N.C. rem. **0**, the same as that from the divisor and quotient.

In an example of this kind, where the divisor contains 11 as a factor, a fuller test ought to be made, to guard against any wrong figure being put down in the quotient by mistake. It may be carried out as follows :—

Divide 638 by 11, and the result is 58; from 58 and 5776 the N.C. rems. are 3 and 1, which, multiplied together, equal 3, and give a final N.C. rem. **3**. Next subtract the *remainder* 383 of the question from the *dividend* 3685471, and *divide the result*, 3685088, by the factor 11; from this we get 335008, of which the N.C. rem. is **3** also.

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LATIN COURSE FOR OCTOBER.

1. Cæsar, Book IV., chaps. xxvi.–xxxi. inclusive.
2. *Anglice Reddenda*, Nos. 11–20.
3. Some sentences each week from one of the books recommended in the last number.
4. Grammar.—Read the declension of adjectives in the accidence; the formation of the comparative and superlative; the formation of the positive, comparative, and superlative of adverbs. Note the adjectives and adverbs which are (*a*) compared irregularly, (*b*) defective in either the comparative or superlative. Note the adjectives (*a*) in *us* and *er* that are declined like *unus* and *alter*, (*b*) in *er* that are declined like *acer*. Learn a list of the adjectives that have the genitive plural in *um* (most adjectives have *ium*). Learn carefully the defective and irregular nouns, like *Iuppiter*, *bos*, *senex*, *supellex* (no plural); heteroclite nouns (that is, nouns belonging to more than one declension), like *domus*, *laurus*, *vas*, *ingerum*; heterogeneous words, like *locus* (*loci* and *loca* in the plural), *rastrum*, etc. Note nouns used only in the singular; nouns used only in the plural; nouns that differ in meaning in the singular and plural (be able to quote at least six of these). Note *nemo*. The genitive and ablative of *nemo* are wanting, and their places are supplied by *nullius* and *nullo*. Note that *plurimorum* is used as genitive of *plurimus*.

Typical Sentences.

4. "We ought to tell you why we pardoned the citizens."
Cur civibus ignoverimus tibi (*vobis*) *dicere debemus.*

Notes.—(*a*) "You" is expressed by *tu* when only *one* person is referred to, by *vos* in reference to *two* or *more* persons. (*b*) The subjunctive *ignoverimus* is used because it is the verb in a dependent or indirect question. The Romans considered every sentence an indirect question if it was introduced by an interrogative word, and was at the same time a dependent sentence. Now, in this case, we have the interrogative *cur*, hence the subjunctive. *N.B.*—The Latin subjunctive in such cases must *not* be translated by "may" or "might" in English, as there is *no* doubt implied. Beginners are often guilty of this mistake. Roughly speaking, "may" or "might" is represented by the subjunctive only in (1) purpose clauses, (2) in wishes. The words "may" and "might" are a very common translation of the Latin subjunctive, and are in most cases erroneously used. One of the greatest stumbling-blocks to a student of Latin is to know what tense of the subjunctive he has to employ. The rule is this:—If the verb in the clause on which the subjunctive depends is in a primary tense (that is, in the present, future, future perfect, or present perfect—that is, the perfect with *have* in English), use either the present or perfect subjunctive: the present if the time of the verb in the subjunctive is the same as, or future to, that of the principal verb; the perfect if the time of the action of the verb in the subjunctive is antecedent to that of the principal verb—for example, *te rogo cur hoc faciat*, "I ask you why he does this;" but *te rogo cur hoc fecerit*, "I ask you why he did this." If the verb in the clause on which the subjunctive depends is in a secondary or historical tense—that is, a tense that is not primary—use the imperfect or pluperfect subjunctive: the imperfect if the action of the subjunctive verb is the same as, or future to, that of the principal verb, or if the action is continuous; the pluperfect if the action of the subjunctive verb is antecedent to that of the principal verb—for example, (*a*) *te rogavi ut hoc faceres*, "I asked you to do this;" (*b*) *te rogavi cur hoc fecisset*, "I asked you why he had done this." In (*a*) the action of "doing" is future to that of "asking," therefore the imperfect *faceres* is used. In (*b*) the action of "doing" is antecedent to that of "asking," therefore the pluperfect *fecisses* is used. (*c*) Verbs of "pardoning" are intransitive in Latin, and govern the dative case; hence we use *civibus* and not *cives*. Students should commit to memory a list of verbs that govern the dative.

5. "Each of you said that the soldier would come to Rome as quickly as possible."
Vestrum quisque militem Romam quam celerrime venturum dixit.

Notes.—(*a*) "Of you" is expressed either by *vestri* or *vestrum*, and *vestri* is used if it depends on a noun or adjective or verb, except when "you" denotes the whole of which a part is taken, as here, when *vestrum* (partitive genitive) is used. The same distinction exists between *nostri* and *nostrum*. (*b*) "As.....as possible" is expressed by *quam*, and the superlative of the Latin adverb corresponding to the English adverb. (*c*) *Esse* may be omitted in the future infinitive active and perfect infinitive passive. (*d*) *Venturum*, accusative masculine singular, agreeing with *militem*. Avoid writing *venturus*—a common mistake. (*e*) The future infinitive is used because the *coming* is future relative to the *saying*. (See last month's Sentences.)

6. "After ascertaining that the general would stop at Rome or Naples, we said that *you* would not go to Athens."
Cum ducem Romae vel Neapoli mansurum (*esse*) *cognovissemus te* (*vos*) *Athenas iturum* (*ituros*) *negavimus.*

Notes.—(*a*) The verbal noun after the prepositions "after," "on," "without," "instead of," etc., is not to be translated by the gerund in Latin. "After ascertaining" = "having ascertained," "when we had ascertained," *cum cognovissemus*. This is one of the commonest ways of supplying the want of the perfect participle active. (*b*) *Mansurum* agrees with *ducem*, its subject, which is accusative masculine singular. (*c*) "Place where" is generally expressed by "in" and the ablative. With names of towns and small islands, however, the genitive form is used if the name of the town or small island is a singular word of the first or second declension; otherwise the ablative form without a preposition is used. Hence *Romae* and *Neapoli* above. (*d*) For the future infinitive *iturum* see 1 (*b*) last month. (*e*) Note that Athens is in Latin *Athenae*, a plural word of the first declension. For the accusative see 2 (*c*) last month. (*f*) The Latins did not say *dico.....non*, but *nego*. The *you* is expressed by *te* if only one is referred to, otherwise by *vos*.

Test Paper—Latin.

(Readers can have their solutions corrected by sending them to the Editor Matriculation Course *P.T.* and enclosing seven stamps.)

1. What are the rules for the agreement of the relative in Latin? Give examples.
2. Decline throughout—*frugi homo*, *ingens paterfamilias*, *nobilis iuvenis*, *niger canis*, *pulchra mater*.
3. Mention eight words which differ in meaning in the singular and plural. Write out their meanings.
4. Write notes on the peculiarities of *locus*, *rastrum*, *laurus*, *domus*, *ingerum*, *supellex*, *senex*, *nemo*, *plerique*.
5. Compare *novus*, *similis*, *habilis*, *pius*, *maledicus*, *iuvenis*, *acer*, *sacer*, and mark the quantities of all the vowels.
6. What are the rules which determine the form of (*a*) the ablative singular, (*b*) the genitive plural, of adjectives of the third declension?
7. When does the accusative plural of words of the third declension end in *is* instead of *es*?
8. Explain what you mean by the terms—heteroclite, heterogeneous, and epicene. Give an example of each kind.

Sentences for Practice.

(Readers can have their exercises corrected by sending them to the Editor Matriculation Course *P.T.* and enclosing seven stamps.)

1. Who can inform the consul why we went to Rome ten days ago?
2. No one said that we would go to Syracuse (*Syracusae*) in four days.
3. Some one (*aliquis*) said that we would spare (*parco*) the inhabitants of London (*Londinienses*).

4. Four thousand sailors promised to go to Sicily in the men-of-war (*navis longa*).
5. Five transport ships (*naves onerariae*) sailed ten miles nearer to the sea-coast (*ora maritima*).
6. I cannot hope to reach Rome in four days.
7. We know that you were not injured by the Romans.
8. All the sailors will not be able to promise to favour (*faveo*) these men.
9. He said that he would do this with the greatest possible diligence (= as diligently as possible).
10. We threatened to punish him in ten days' time.

Cæsar—Book IV., xx. to xxv.

Notes.

Chap. xx.

Parte reliqua—ablative absolute. As the verb "to be" has no participle, an adjective and a noun are often found in the ablative absolute.
omnibus bellis—ablative of time.
subministrata, sc. *esse*. In the future infinitive active and perfect participle passive the *esse* is generally omitted. The infinitive is used, according to the rule given last month, after the verb of *sentiendi* (*intellegebat*).
usui—predicative dative. This dative, together with the dative of the person *sibi*, forms the *double* dative.
loca, portus, aditus—note that in an enumeration *et* is not used with the last noun except when it has been used with the previous nouns.
quae omnia—we say, "*all* of which" (*omnia quorum* is bad Latin).
illo—adverb.
quisquam—"any one," in a negative sentence.
vocatis.....mercatoribus—ablative absolute; best translated here by an active participle agreeing with the subjunctive of *poterat*, "having called," or "calling."
essent, incolerent, etc.—are subjunctives of dependent questions. (See Notes in Typical Sentences.)
usus belli—"experience in war." The Latin genitive is not always translated by "of" in English.
institutis—ablative, depending on *utor*. Note the deponent verbs which govern the ablative.

Chap. xxi.

Ad.....cognoscenda—*ad*, with the gerund or the gerundive, expresses a purpose; it is often translated in English by "to" and the infinitive. This is an instance of gerundive attraction.
faceret—subjunctive of *oratio obliqua* (part of what Cæsar thought).
navi longa—"man-of-war." Note technical phrases like this.
ut revertatur—"to return." Subjunctive with *ut*, to express purpose after a verb of ordering. (See Rules.)
quam primum—"as soon as possible." For this usage of *quam* with superlative, see this month's Notes.
iubet convenire—*iubeo* is the only verb of "ordering" that requires the accusative and infinitive.
qui polliceantur—"to promise:" *qui*, expressing a purpose (= in order that they), requires the subjunctive. This is another of the ways in which "to" and the infinitive may be translated in Latin.
dare—*se daturos* (*esse*), future infinitive after a verb of promising, would be expected. Readers had better not imitate this use of the present infinitive.
imperio—dative after *obtemperare*, a verb of "ordering."
hortatus ut permanerent—same construction as *revertatur* above, "exhort them to remain."
domum—"home," motion to without a preposition; compare *Romam eo*. (See Notes.)
una—adverb, "together."
sibi—not *ei*, because it refers to the subject of *arbitrabatur*.
magni—genitive of price.
possit—subjunctive of *oratio obliqua* (part of what Cæsar said).
adeat—depends on *imperat; ut*, with the subjunctive, is more usual.
eo—use *eo* for "there" when "there" is equivalent to "thither."
se is used, not *eum*, because the subject of the infinitive *venturum* is the same as the subject of the verb on which it depends (*nuntiet*).
perspectis regionibus—ablative absolute.
facultatis—partitive genitive, depending on *quantum*.
qui = "since he"—*qui*, in a causal sense, generally requires the subjunctive.
navi—ablative of separation. Note the ablative in *i*.
perspexisset—subjunctive of dependent question. The tense at first seems to be a violation of the rule of the "sequence of tenses," but you must remember that *renuntiat* is an *historical present* tense. An historical present may be taken either as a primary or as a secondary tense.

Chap. xxii.

dum.....moratur—*dum*, "while," is generally followed by the present indicative.
parandarum causa—the genitive of the gerund or gerundive, with *causa*, is another way of expressing purpose. Translate "to get ships." This is also an instance of gerundive attraction. The original form is *naves parandi causa*.
qui.....excusarent—subjunctive with *qui*, denoting a purpose (*qui* final).
fecissent—subjunctive in *oratio obliqua* (sub-oblique oration). When the reason given is not the reason of the speaker or writer, but some one else's reason, *quod* requires the subjunctive as here.
belli gerendi—depends on *facultatem;* gerundive attraction again.
anteponendas, sc. *esse*—infinitive of the gerundive, depending on the verb of *sentiendi* and *declarandi* (*indicabat*). Translate in English the gerundive by *must* or *ought* (with active infinitive in preference to passive infinitive).
Britanniæ—dative depending on *anteponendas*.
numerum imperat—*impero* governs the accusative of the thing requisitioned, and the dative of the person ordered, "orders them to supply a large number of hostages."
quod navium—*navium*, partitive genitive, depending on *quod;* literally, "what of ships"—that is, "whatever ships."
accedebant—"were added." Distinguish this from *accidebant*.
ab.....octo—curious use of *ab*. The accusative would be more natural. Note *passuum*, genitive depending on *milia*, which is a noun in the plural and an indeclinable adjective in the singular.
vento—ablative of instrument.
quo minus—used with the subjunctive after verbs of *preventing*.
ducendum—the gerundive is used after *curo, do*, and some other verbs, in agreement with the object (here *exercitum*), to denote what is to be done with that object.

Chap. xxiii.

solvit—"weighed anchor."
cum esset administratum—*cum*, with a past tense, requires subjunctive when it can be translated by *since* or *although*.
ut.....posset—subjunctive after *ut*, denoting result.
nequaquam—"by no means," to be distinguished from *nequicquam*, "in vain."
dum.....convenirent—*dum*, "until," when conveying an idea of purpose, requires the subjunctive.
cognosset.....vellet—subjunctives of dependent question.

Chap. xxiv.

consuerunt—perfect of *consuesco*.
egredi—*prohibeo* is followed, sometimes by the infinitive, sometimes by *quominus* (or *ne*) and subjunctive; we use in English "from" and the verbal noun, a construction inadmissible in Latin, and found only in beginners' exercises.
desiliendum—called by some the gerundive used impersonally, by others the nominative of the gerund (literally, "there is a leaping down by the soldiers"). We say, "the soldiers had to leap down." *Militibus* is dative of the agent.
conicerent—subjunctive, depending on *cum*, "since."
quibus rebus—we would use the demonstrative, and say, "those things."

Chap. xxv.

figura—instrumental ablative.
militibus cunctantibus—ablative absolute.
ut.....eveniret—subjunctive of purpose.
ne.....admitteretur—a negative purpose is expressed by *ne* and the subjunctive.
hostibus—dative, depending on *appropinquarunt*.

N.B.—I should advise readers of The Practical Teacher, even if they do not intend to present themselves in June 1900, to follow the notes on Cæsar. They are mainly grammatical, and will, I think, prove useful in impressing the ordinary Latin constructions on their minds.

Readers cannot do better than commit to memory every week a certain number of lines from Cæsar. There is nothing which so much facilitates the acquiring of a good vocabulary, and a practical knowledge of Latin idiom.

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

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SPRING EXAMINATION, 1900.

Seventh Month—October.

WORK TO BE PREPARED.

1. READING AND REPETITION.

CONTINUED oral practice, with due attention to emphasis, modulation, clear enunciation and articulation.

2. ENGLISH.

Candidates.—*Marmion*, Canto vi., lines 569 to 680.

First Year.—*The Traveller*, lines 239 to 296, with twenty roots and meanings each week, and the derivations of the most important words in the passage set for preparation.

Second Year.—*Julius Cæsar*, Act iii., Scene 2.

All notes, meanings of allusions, derivations, etc., must be prepared. For *notes*, see below.

3. ESSAYS.

Write one or two essays each week, selecting from the following:—Holidays, The Penny Post, Cheerfulness, Paper-making, Knowledge is Power, Fairy Tales, Fishing.

4. HISTORY.

Candidates.—The Tudors, 1485–1603.
First Year.—The Lancastrian Kings, Henry IV. to Henry VI.
Second Year.—William and Mary. Anne.
} Notes below.

5. GEOGRAPHY.

Candidates.—The counties of Wales.
First Year.—Asia: the physical features, climate, and productions.
Second Year.—British North America.

6. ARITHMETIC.

Candidates.—Recurring Decimals.
First Year.—Compound Interest.
Second Year.—Continue practice in Stocks and Shares.

7. EUCLID.

First Year.—Props. 17–20, and four deductions each week.
Second Year.—Revise definitions, axioms, and postulates, and Props. 1–6, with eight deductions each week.

8. ALGEBRA.

First Year.—Continued practice in factors.
Second Year.—Simple equations, and problems thereon.

9. MUSIC.

All Years.—Finish the syllabus set, and work weekly a set of questions.

Notes on the Month's Work.

1. ENGLISH.

(*a*) "MARMION."

Parsing and Analysis.

Line 569. *Even.* Adv. of Emphasis, mod. *so.*
571. *Leave* = to leave. Infinitive Mood, part of the object of *beheld.*
Post. In app. with *Barmare Wood.*
574. Present Tense used in this and succeeding lines to add a graphic touch to the narrative; usually termed "Historical Present."
580. Read, *You see—troop after troop rearing their banners.*
582. *Still.* Adv. of Time, mod. *pouring.*
583. This line is Adjectival to *den.*
582–7. Understand *You see standards*, etc. The remainder of the lines are enlargements of the object.
587. *To gain.* Infinitive of Purpose, limiting *pressing.*
590. *Morn.* Adverbial Object to *rang.*
595. *Bloom.* Infinitive gov. by and forming part of the object of *see.*
597. *Roans.* Direct Object. *Columns*, Indirect Object.
598. *Why.* Interrogative Adverb.
600. *While.* Abs. Noun. Adv. Object.
604. *Inactive.* Adjectival Completion of *sits.*
607. *Lord Surrey to lead his host.* Object of *sees.*
608. *What.* Interrog. Pron. Object of *avails.*
609–613. Exclamations like this cannot be analysed or parsed unless the phrase is made into a sentence by supplying some such words as "I wish."
611. *Wight.* An Adj. qual. *Wallace* (equal in meaning to *strong* or *powerful*).
614. *Morn* = Subject. *Sight* = Object.
615. Read *had been torn.*
617. *In vain.* An Adverbial Phrase, mod. *has passed.*
619–20. Participial Enlargements of *host.*
621. *Ere.* Adv. Conj., connecting this and succeeding sentences.
Yet. Adv. of Time, mod. *met.*
622. *Loud* and *high.* Adverbs. (Poetical licence.)
626. *Foot, horse, and cannon.* In apposition with *squadrons.*
Hap what hap. Read, *Let that happen which may happen.*
627. Read, *I will lay* (*wager*) *my bonnet to a prentice cap.*
628. *That Lord Surrey is, etc.* Noun Sentence gov. by preceding.
631. *Gallant* for *gallantly.*
632–3. Extension of Manner to *sweep.*
635. *To see.* Infinitive of Purpose. *Fly* = *to fly* (an Infinitive).
636. Arrange—*Thou wouldst do best to stint in thy prate and to listen, etc.*
Best. An Adv., Superlative Degree—the Infinitives enlarging it.
639. *Be arrayed.* Imperative Mood, Third Person.
641. *May join.* Not Subjunctive Mood. *May* = *can.*
642. *Fight.* Subjunctive Mood.
643. Noun Sentences to *trust.*
645. *Joins.* Used intransitively in this case.
646. *Himself.* Reflexive Pronoun.
647. *Scarce* for *scarcely.* *Adieu*, an Abstract Noun.
648. *Far.* Adv. of Degree, mod. the Adv. of Degree *less*, which modifies *listen.*
649. *To leave.* Gerundial Infinitive, in apposition with *prayer.*
652. The meaning here is a little obscure. Probably it is: "The falcon (Marmion) having the pheasant (Clare) in its claw, will scarcely yield it up to a daw (the Abbot). Douglas may compel the Abbot to return Clare to him, to prevent which she shall stay with me."
659. *Moment.* Adverbial Object.
661. *Headmost.* Adj., Superlative Degree, qual. *he.*
666. *Though.* Adv. Conj., connecting *driven* and *gain.*
Perforce. Adv., mod. *driven.*
668–9. Read, *The train, struggling behind them, came to shore—as—they might come to shore best.*
671. *Caution.* In apposition with the fact stated in 670.
672. Read, *There was deep need that day, etc.*
675. *Breathed.* Transitive—a causative. Compare "He walked his horse."
Men. Obj. Case, gov. by *arrayed.*
677. *Rear-guard.* Nominative Absolute.
679. *Lone.* Adjectival Completion of *standing.*

(*b*) "THE TRAVELLER."

General Paraphrase (continued).

Line 239. We next direct our attention to the land which is proverbial for gaiety and happiness, and consider what constitutes the happiness of her population. France is a country where social amenities are certainly observed; and pleased with all others, it is satisfied with itself. My memory brings before me the many occasions on which, in the villages beside the murmuring Loire, I have attracted the whole population by the notes of my flute. Under the shade of the elms, and fanned by the cool breeze from the river, they have assembled, and, forgetful alike of the time and other duties, have indulged in a country dance to the music I made for them—music which, in their kindliness of manner, they praised much more than it deserved. Nor was this merry crowd limited to the younger villagers; for old women danced with their children, and grandsires in the decline of life could not resist the temptation of exhibiting the skill for which they were once famous.

Line 255. This is characteristic of the French; their life passes away busied in trifles, devoted to obtaining the esteem and goodwill of others. Honour is their god, whether it be the regard arising from real worth, or that derived from ostentation and pretentious display. From the highest in the land to the lowest—courtier, and soldier, and peasant—they all crave for the approbation of others, till the whole country is permeated with an atmosphere of mutual admiration.

Line 267. This particular form of happiness inevitably begets "its own peculiar pain," and induces in its exercise less admirable qualities; for when people are so keenly desirous of the esteem of others, they soon become lacking in the strength of mind and firmness of will which are necessary to uphold what is right at the expense of ridicule and blame. Since their chief happiness is the admiration of others, they concentrate their efforts entirely upon obtaining it; and this leads to vulgar and ostentatious display. The peasant, unable to afford gold lace, must needs trim his rough garments with copper; and the beggar will starve himself for a year to indulge in one costly and showy meal. Continually pondering on what others will think of them, they miss one of the chief happinesses of life—the self-consciousness of having done what is right.

Line 281. A great contrast to these warm-hearted and light-headed people is the persevering, hard-working Hollander. In his low, swampy country, much of it below the level of the sea, he steadily and laboriously raises the dike which keeps the ocean out, he advances it further and further, till he has pushed the waves back, and has reclaimed a whole country from the clutches of the sea, which, peeping over the barrier thus erected, sees an amphibious world beneath him—a maze of canals lined with drooping willows, and bearing on their quiet waters the slow-moving barges, fields coloured with the bloom of flowers or with crops of various kinds, and busy, crowded cities.

Parsing and Analysis.

Line 241. *Land.* Nominative of Address.
243. *How.* Interrogative Adverb, mod. *often.*
248. *But.* Adverb of Degree to *mocked.*
249. *Yet.* Adversative Conjunction.
251. Read, *All ages were alike.*
255. *So.* Adv., mod. *blest.*
256. *Idly.* Adv., mod. *busy*, which is an Adj., qual. *world.*
258. *For.* Illative Conjunction.
260. *Even.* Adv. of Emphasis, mod. *imaginary.*
264. *Avarice.* Residuary Object to *are taught.*
266. *Blest.* Adjectival Completion of *seeming.*
To. A Preposition governing the Noun Clause *to get esteem.*
267. *But.* To be taken with the next line.
Art = Subject. *Bliss* = Object.
268. *Also.* Adv., mod. *gives.*

278. *To boast.* Infin. of Purpose to *defrauds.*
Once. Adv. of Repetition.
Year. Adverbial Object.
283. *Methinks.* A Word Sentence = (It) thinks me.
285. *To stop.* Infin. Mood, limiting *sedulous.*
286. Supply *they* as subject.
292. *Smile.* An Infinitive, gov. by *sees.*
293-5. The nouns in these lines are best taken as in apposition with *creation* (296).

"JULIUS CÆSAR," *Act iii., Scene 2.*

Paraphrasing, Parsing, and Analysis.

Line 5. *Will.* Here a Principal Verb: Those who will—to hear me speak.
10. *Severally*—that is, separately. Adv., mod. *rendered.*
12. *Till.* Preposition.
19. *Demand.* Subjunctive Mood.
20. *Not.* A Negative Adverb, mod. the verb *rose.*
21. *Rather.* Comparative Adverb.
25. *There is tears.* An apparent violation of a law of syntax. The singular is used because in the speaker's mind there is *one* main reason.
27. Note the peculiar form of these sentences, which imply as well as ask a question. It was impossible to answer otherwise than in the negative.
36. *Wherein.* A Relative Adverb = *in which.* Compare *whereby, wherefrom*, etc.
44. *To need my death.* In apposition with *it.*
58. *Not a man depart* = *that not a man do depart.*
59. *Save I. Save* is often called a Preposition, and as such should be followed by the Objective Case. In this instance it is used as a conjunction—But I (will depart).
Spoke for *spoken*, the proper form of the participle.
66. *'Twere* = *it were.* Subjunctive Mood.
68. *That....him.* Adverbial Sentence of Reason to *blessed.*
71. Mark Antony's speech deserves the closest study. The manner in which he appeals to the vanity of his hearers, to their sympathy, their pity, their curiosity, their self-interest, exhibits the wit of the dramatist in its highest form. The word *ambition*, so frequently used, signifies "going about to seek his own advancement" (Lat. *amb*, around; *eo, itum*, I go). To be accused *de ambitu* in Rome was to be charged with bribery.
108. *Consider.* Subjunctive Mood.
111. *He was not ambitious.* Noun Sentence, in apposition with *it.* (The argument of the citizen is very simple and childlike.)
112. *Dear* for *dearly.* Poetic licence.
116. *But* = *only.* Adverb of Degree, mod. *yesterday.*
118. *And none is so poor as to do him reverence. As to do, etc.*, is an Adverbial Phrase to *so. Him*, Ind. Obj. *Reverence*, Dir. Obj.
123. *Do them wrong. Them*, Ind. Obj. *Wrong*, Dir. Obj.
128. *But.* Adv., mod. *let.*
134. Read, *As they would bequeath a rich legacy* to get the case.
139. *You know....you.* In apposition with *it.*
142. *Mad.* Adjectival Completion of the Predicate *will make.*
149. *Ever.* Adv. of Emphasis to *first.*
153. *What.* Demonstrative Adj. to *rent.*
177. *As rushing.* Read, *As if it were rushing.*
Out. Adv., mod. *of doors. To be resolved, etc.*, Infinitive Phrase of Purpose to *rushing.*
178. *Or no. No* in this case is equivalent to a whole sentence. It can hardly be taken as an Adverb.
179. *As.* Relative Pronoun. Obj., gov. by *you know.*
181. *Most unkindest.* An instance of double superlative which Shakespeare sometimes uses.
186. *Even.* Adv. of Emphasis, mod. *at the base.*
187. *All the while. All*, Adv., mod. *the while. The while*, Adv., mod. *ran.*
219. *For I have neither, etc.* A professed modesty which the speaker was very far from feeling.
221. *To stir.* An Infinitive, limiting all the preceding Nouns.
Right. Adverb of Manner, mod. *on.*
229. *Belike* = *probably.* Adv., mod. *had.*

2. HISTORY.

Candidates.—The Tudor period is one of great importance—an era of new movement, new statesmanship, new thought, and new development—and hence requires careful study. Note the causes of the high prerogative exercised by the Tudors: (1) the decay of the great baronial houses, which no longer could put a check upon the king; (2) the new and subservient aristocracy; (3) the power of the Commons not yet developed; (4) the general desire for peace; (5) personal character of the Tudors themselves. Henry the Seventh amassed money by various means—which must be observed. His marriage schemes are important in their issues. The marriage of Prince Arthur to Catherine of Braganza brought about the Reformation in England; that of Margaret to James the Fourth of Scotland, the Stuart dynasty of kings. The Revival of Learning and the Reformation in England are topics of immense importance. Elizabeth's reign was treated fully in last month's paper.

First Year.—The Lancastrian kings. Chief points:—The plots against Henry the Fourth; the growth of the influence of Parliament; the Lollards and the Statute De Heretico Comburendo; Henry the Fifth's brilliant campaign in France; Henry the Sixth's minority, with its attendant evils; loss of France; discontent in England, and the events leading up to the Wars of the Roses. Prepare a good genealogical table showing the Lancastrian, Yorkist, and Beaufort lines.

Second Year.—William and Mary. Note the vast importance of the Bill of Rights, as settling for ever the points of dispute between the king and the parliament; the reduction of Ireland and Scotland; the Mutiny Bill; the Triennial Bill; the beginning of government by party, and the foreign policy which was to curb and curtail the power of Louis the Fourteenth. This was continued in Anne's reign in the War of the Spanish Succession, with Marlborough's splendid victories, and the somewhat disappointing issue of the whole war. The Union with Scotland must be carefully studied, and the political importance of Dr. Sacheverell's trial.

GEOGRAPHY.

In all years the same process of preparation must be followed. Plenty of sketch maps, and continual repetition till known.

Second Year.—Pay especial attention to the productions, imports, and exports. All students should obtain from the Agent-General for Canada the excellent handbooks issued on the provinces, giving the most recent information. Klondike and its goldfields demand attention. Note the term *Dominion of Canada*, what it really means, the effects produced by federation.

The difficulty with the French over their fishing rights on the coast of Newfoundland requires a few words. When Newfoundland was ceded to England, a clause in the treaty reserved to the French the islands of St. Pierre and Miquelon, and the right to use the coast for drying their fish—that is, cod. The evident intention was to afford them an opportunity, equal to that of the settlers, of preserving their harvest of the sea. Since then the French have attempted to make the meaning of the treaty to be that they have the *exclusive* right to the coast, not only for salting or drying cod, but also for fishing and canning lobsters. This has led to much ill-feeling and unpleasantness between the colonists, England, and the French. Unfortunately the difficulty is not yet settled.

ARITHMETIC.

The rules with regard to conversion of recurring decimals into vulgar fractions and *vice versâ* must be clearly understood. All candidates should be able to recognise the *sevenths* expressed as decimals—for example, $\frac{1}{7} = \cdot\dot{1}4285\dot{7}$, $\frac{3}{7} = \cdot\dot{4}2857\dot{1}$, etc. The same figures occur in the same order, but starting at a different digit. All good text-books point this out, but students fail to realise the importance of it. Questions such as the following continually occur in examination papers: "Reduce to a vulgar fraction ·3857142." By the ordinary method this is a tedious process. If, however, the *sevenths* are known, it becomes—

$$\cdot 3\dot{8}\dot{5}\dot{7}\dot{1}\dot{4}\dot{2} = \frac{3\frac{8}{7}}{10} = \frac{27}{70}.$$

First Year.—In working compound interest, adopt the fraction method. For example, Find the compound interest on £4000 for three years at 5 per cent. Now 5 per cent. = $\frac{1}{19\frac{19}{20}}$, or $\frac{1}{20}$ of the capital to be added each year. The sum should be stated thus:—

Principal	=	£4000	0	0
First year's interest = $\frac{1}{20}$ of £4000	=	200	0	0
Second year's principal	=	£4200	0	0
Second year's interest = $\frac{1}{20}$ of £4200	=	210	0	0
Third year's principal	=	£4410	0	0
Third year's interest = $\frac{1}{20}$ of £4410	=	220	10	0
Total at end of three years	=	£4630	10	0
Therefore interest	=	£630	10	0

It is also better to work in decimals than to work out to shillings and pence.

EUCLID.

Practice must be taken in writing out propositions against time, and in using other letters than A to G.

Test Questions on the Month's Work.

1. Penmanship.
Large Hand:—*Superfluity.*
Small Hand:—*A land of tyrants and a den of slaves.*
(Use the *Practical Teacher Copy Book* regularly.)

ENGLISH.

2. *Candidates.*
(*a*) Analyse:—"'I thought *to slay* him *where* he stood.
'*Tis* pity of him too,' he cried;
'*Bold can* he speak and fairly ride,
I warrant *him* a *warrior* tried.'"
(*b*) Parse the words in italics.
First Year.
(*a*) Paraphrase lines 227-238.
(*b*) Analyse:—"Some sterner virtues .....
..... in a kinder sky."
(*c*) Parse *like their pleasures, such as play, to sport.*

Second Year.

(*a*) Paraphrase:—"I could well be moved .... to keep him so."

(*b*) Analyse:—"Yet, in the number .... to keep him so."

(*c*) Parse:—"And that I am he, let me a little show it even in this."

3. *Candidates.*

(*a*) What do you know of the Lollards? In what did they differ from the ordinary church?

(*b*) Draw a genealogical table showing the descent of the Lancastrian, Yorkist, and Beaufort families.

First Year.

(*a*) Give an account of the declining years of Edward the Third's life?

(*b*) What causes led to the Peasants' Revolt, and what were the chief results?

Second Year.

(*a*) What do you know of Monmouth's Rebellion?

(*b*) What was the Declaration of Indulgence? Why was there such opposition to it from some of the people whom it would have relieved?

4. *Candidates.*

(*a*) Describe a coasting voyage from London to Falmouth.

(*b*) Give an account of the manufactures of Shropshire.

First Year.

(*a*) Explain clearly the various states comprising the Balkan Peninsula, saying what are their status, governments, and chief towns.

(*b*) Say what you can of Switzerland under these heads: (*a*) people, (*b*) industries, (*c*) government, (*d*) language.

Second Year.

(*a*) Mention the chief rivers in North America, and give a detailed account of one of them.

(*b*) Give an account of the mineral wealth of the United States.

AUTUMN EXAMINATION, 1900.

First Month—October.

With this month we commence a new Course for pupil teachers, and it may be useful to explain to those of our readers who intend to utilise these Courses what the object of them is, and how they may be used with greatest advantage. There are many pupil teachers who have not the opportunity of attending central classes—teachers who have to work by themselves, and are perhaps unable to obtain efficient instruction. It is for these primarily that the Courses are designed. The work is arranged in monthly portions, to ensure a regular system of work, notes and explanations of difficulties are added as far as space will allow, and periodical test examinations are given exactly on the same lines as the Government examinations. But as it necessarily arises that many points are not dealt with which may puzzle the individual student, all our readers are cordially invited to write for assistance in the solution of difficulties in the work, or for general advice on selection of books, modes of study, or any other topic connected with their work. Specimens of work are marked gratis, and, if desired, arrangements can be made for marking the monthly set of test questions. Any pupil teacher steadily working by this Course, and availing himself of the opportunities it offers, cannot fail to make satisfactory progress, and can rely on passing his examinations with credit. With these few words of explanation, we pass to the consideration of the subjects of Schedule V.* in detail.

The chief alteration to notice is the change in the number of the years of apprenticeship. The syllabus is now arranged for Candidates, First Year, and Second Year—the Third Year examination being the Queen's Scholarship Examination. Those who have just taken the examination as Candidates will take Candidates' work. First Years will again be First Years, and Second Years, Second Years. The other changes will be noted under the various subjects.

Subject.	Syllabus.	Text-books.
Reading.	Candidates—Scott's *Talisman.* First Year—Southey's *Life of Nelson.* Second Year—Macaulay's *Essay on Frederick the Great*, and Bacon's *New Atlantis.*	Blackie's. Macmillan's. Macmillan's.
Recitation.	Candidates—70 lines. First Year—80 lines. Second Year—100 lines.	From the prescribed books.
English.	Candidates—Analysis of easy sentences and parsing. Knowledge of the ordinary termination of English words. A short theme or essay. *Marmion*, Canto vi.	Practical Teacher's *Pupil Teachers' Notebook.* Nelson's.
English.	First Year—Parsing, construction, and analysis of sentences. First elements of etymology. Paraphrase, or short essay. Goldsmith's *The Traveller.*	Any good grammar. (See above.) Macmillan's.
	Second Year—Parsing, construction, analysis of more difficult sentences. Elementary history of the English language. Common errors in language, written and spoken. Paraphrase, or a short essay. *Julius Cæsar.*	 Practical Teacher's *Pupil Teachers' Notebook.* Do. Nelson's, and Moffatt's.
History.	Candidates—General outlines of English history.	Macmillan's *Outlines of English History.*
	First Year—King Alfred to Queen Elizabeth (inclusive), with special knowledge of the Norman Conquest. Second Year—1603-1870, with special knowledge of the Civil War and Protectorate.	Meiklejohn's.
Geography.	Candidates—Chief physical features of the globe. The British Isles.	 Blackie's *Manual.*
	First Year—Europe and Asia, with special reference to Germany, France, and the Indian Empire. Second Year—Africa, America, and Australasia, with special reference to the chief British colonies and dependencies, and the United States.	Meiklejohn's. Meiklejohn's.
Arithmetic.	Candidates — Arithmetic, including vulgar and decimal fractions, simple proportion and practice. First Year—The preceding, with proportion and its application to simple interest and percentages. The Metric System. Second Year—Arithmetic generally, including measurement of rectangular areas and solids.	Christian and Collar's *New Arithmetic* (Holden).
Euclid.	First Year—Book I. to Prop. 26, with deductions. Second Year—Book I., with deductions.	Any standard text-book.
Algebra.	First Year—First four rules; easy equations and problems. Second Year—G.C.M. and L.C.M.; fractions; equations of two unknown and easy problems.	Any standard text-book.
Music.	As before.	Stanton's *Notes* (Curwen).
Teaching.	Candidates—To set copies on the B.B. To correct dictation exercises, sums, and copies. First Year—The preceding. To question a class. Second Year—The preceding. Notes of lesson. To give a lesson on a subject taught by the pupil teacher during the year, or to give a lesson to an infant class.	
Elementary Science.	As before.	Cartwright's *Physiography*, Sect. I. (Nelson's).

Work for the Month.

Repetition.—Ten or twelve lines per week of the Recitation should be learned. In *Marmion*, the candidate would do well to learn from line 735 to line 870; in *The Traveller*, First Year pupil teachers might start at line 50; in *Julius Cæsar*, Act i., Scene 2, commencing "Will you go see the order of the course?" to "Have struck but thus much show of fire from Brutus," *or* Mark Antony's Oration, Act iii., Scene 2, *or* Act iv., Scene 3, the first 120 lines. In addition to the particular lines prepared for the examination, any passage of special note should be committed to memory.

English—Candidates.—Marmion, Canto vi., lines 1–130. Read up the summary of the preceding cantos given, or preferably read the whole of the poem. To obtain an intelligent grasp of this canto, this is absolutely necessary; it is of little use to study scraps of literature, and the interest attached to this poem renders the reading a pleasure rather than a task. It is to a large extent impossible to understand the final canto unless the previous history of the characters is known.

First Year.—The Traveller. For this month prepare lines 1–50. Learn the meaning of all allusions and the derivations of the chief words, *or* twenty roots and meanings each week from a good list.

Second Year.—Julius Cæsar. For this month prepare Act i., Scenes 1, 2, to line 214, concluding, "And tell me truly what thou think'st of him."

Notes.—N.B. Owing to the length of the play, it will be quite impossible to paraphrase the whole of it, or to give very lengthy notes on parsing and analysis. Passages presenting special difficulty in meaning will be explained, and students following this course must write for assistance in cases of difficulty not dealt with.

A notebook must be kept, and into it entered explanations of all allusions, explanations of phrases, a list of words used with other than their modern meaning, derivations of chief words, etc.

(*For Paraphrases and Notes see May Number.*)

Essay Writing.

To ask a pupil teacher to write an essay on any given subject is a good means of testing amount of reading, composition, and general literary ability. An essay is a safe criterion of ability in these respects.

There is no royal road to success, no simple rules to be learned, no formula by which it can be done. As in most exercises, practice makes perfect; and it is only by steady and thoughtful reading on the one hand, and continual attempts on the other, that anything like distinction can be attained. Endless directions might be given, but they are more burdensome than useful. If any text-book is obtained, let it be Meiklejohn's *Art of Writing English* (A. M. Holden). The companion book, *One Hundred Essays in Outline*, will also be found useful.

The two chief points necessary to produce a good essay are—(1) an abundant knowledge of the subject, to be obtained only by reading; and (2) the ability to arrange the knowledge into coherent and logical form, and to express it in good English. In other words, *read*, *classify*, and *write*.

An essay must be written each week. Select from the following, and send up an essay occasionally for criticism:—

1. Spring; 2. Flowers; 3. Domestic Animals; 4. A Country Walk; 5. An Old Farmhouse; 6. Your Native Town.

HISTORY.

Candidates.—The scope required will probably not be more than that covered by ordinary history readers, and in fact it will be a mistake for candidates to attempt too much. What is required is a clear idea of English history as a whole, the gradual development of institutions, the chief landmarks, and the leading events.

Prepare From the Roman Invasion to the Norman Conquest.

First Year.—Prepare Alfred to 1066.

Chief Points.—The defeat and settlement of the Danes. Treaty of Wedmore. Alfred's reforms: Army, Navy, Finance, Law, Education, etc. Dunstan, the first of a series of great churchmen, and the events connected with his life.

The Third Danish Invasion. The Danish kings.

Edward the Confessor—his connection with Normandy. The way in which his reign assisted or caused the Norman Invasion.

Earl Godwin and his sons, particularly Harold.

Saxon life and institutions.

Second Year.—James the First.

Chief Points.—The descent of the Stuarts, including Arabella Stuart; their right to the throne.

The various plots—Main, Bye, and Gunpowder.

The Millenary Petition and the Hampton Court Conference. The Authorised Version of the Bible.

The growth of the Puritans as a religious and political party.

The Stuart theory of Divine Right of Kings—Passive Obedience—Dispensing Power.

James's Favourites.

GEOGRAPHY.

Candidates.—Chief physical features of the globe.

This, I take it, means a knowledge of the position of the continents, chief oceans and seas, the countries comprising the various continents and their capitals, with a few of the leading ports.

First Year.—This, being a repetition of last year's work, will be somewhat easy, and allow of more time being devoted to arithmetic, which will need it.

Prepare Europe generally—position, extent, physical features, climate, productions, and peoples.

Second Year.—Africa generally, and the northern states: Morocco, Algeria, Tunis, Tripoli, and Egypt.

In each case draw a map, and insert all places to be learned, and those only. Note productions, industries, and chief towns.

The reason of the British occupation of Egypt should be carefully noted, and also its results.

ARITHMETIC.

Candidates.—Simple practice, with theory of aliquot parts.

First Year.—Vulgar fractions. Theory and definitions of various kinds. Addition, subtraction, multiplication, division (complex and compound).

Second Year.—Simple proportion. Read up the theory of ratio *very* carefully. Be prepared to state and work all sums by method of ratio or method of unity.

EUCLID AND ALGEBRA.

First Year.
- Euclid—Definitions, axioms, and postulates.
- Algebra—Meaning of terms, substitution of numerical values.

Second Year.
- Euclid—Props. 26–30, with four deductions per week.
- Algebra—G.C.M.

MUSIC.

Candidates.—Common major scale—its structure and intervals.

First Year.—First removes of key.

Second Year.—The minor scale—its structure, and relation to the major.

TEACHING.

Practise writing on the blackboard, *after* writing the same letters on paper. (Use the *Practical Teacher Copy Book.*)

No test questions will be set this month, but pupil teachers should paraphrase and analyse the English set, and parse all words presenting difficulty. Specimens of work are criticised gratis.

SCHOLARSHIP COURSE FOR DECEMBER 1899.

1. *Penmanship.*—Ten minutes' practice daily from *Practical Teacher Copy Book.*
2. *Composition.*—Write one or two essays each week (subjects below).
3. *English Language and Literature.*
   - (1.) Learn twenty roots and meanings per week.
   - (2.) Revise analysis. Kinds of sentence. Various forms of subject and object, etc.
   - (3.) Pp. 415–480, Collier's *History of English Literature.*
   - (4.) Analysis and parsing of Pope's *Essay on Man*, Ep. iv., lines 1–130.
4. *Arithmetic.*—Christian and Collar, chaps. xlviii., xlix., and l. (measurement of areas, solids, and evolution).
5. *Euclid.*—Book II., Props. 9–12, with six deductions per week.
6. *Algebra.*—Hall and Knight, chaps. xxviii. (harder factors) and xxix.
7. *Geography.*
   - (1.) Revise England, Scotland, and Ireland.
   - (2.) Revise Central America.
   - (3.) Practise memory maps regularly. (Use *Methodic Memory Maps*, PRACTICAL TEACHER Office.)
8. *History.*—George the Third to 1800.
9. *Teaching.*—Chaps. xiii. and xiv., *Scholarship School Management.*
10. *Domestic Economy.*—Revise Food.
11. *Music.*—Chap. x., *School Music Teacher.*
12. *French.*—Next three pages of *Le Trésor.*
13. *Physiography.*—Next two chapters in Gregory.
14. *Freehand.*—One or two copies each week.

Notes on the Month's Work.

Composition.—Subjects for practice:—

- (*a*) Give an account of the life and works of the author of the passage you have learned to recite.
- (*b*) The pleasures of gardening.
- (*c*) The life of the teacher: its difficulties and its ideals.
- (*d*) The Spanish-American War.
- (*e*) The development of British South Africa.
- (*f*) "We are such stuff as dreams are made of."

Send up an essay for criticism occasionally.

English.—The chief writers to note in this period are Thomas Moore (*Irish Melodies*, *Lalla Rookh*), Thomas Campbell (*Pleasures of Hope*, *Gertrude of Wyoming*, and smaller poems—*Hohenlinden*, *Lord Ullin's Daughter*, *The Battle of the Baltic*, *Ye Mariners of England*), Mrs. Hemans, Shelley, Keats (*Hyperion*, *Eve of St. Agnes*), Hallam (Histories), Charles Lamb (*Essays of Elia*), Coleridge (*Ancient Mariner*, *Christabel*), Southey, Wordsworth (*Lyrical Ballads*, *The Excursion*), Macaulay (*Essays*, *Reviews*, *History*, and *Ballads*).

The chief general point in the literature is the growing influence of what is called the Lake School of Poetry. Revolting from the monotonous iambic pentameter, and the subjective disquisitions on man, the poets of this period wrote in any stanza that took their fancy, and dealt largely with the objective study of nature. They inculcated rather an appreciation of the won-

drous works around us than the pursuit of philosophical discussion of abstruse subjects. That the nation generally was tired of the latter is shown by the welcome given to, and popularity attained by, these poets.

The analysis and parsing of Pope's *Essay on Man* will require much attention. Students should endeavour to understand the general line of argument adopted, although it is unnecessary to go deeply into the somewhat chaotic philosophy contained in the poem. If any insuperable difficulty is experienced, students must write for assistance; but Scholarship candidates should see the Notes on this poem now appearing in the Certificate Course.

Arithmetic.—The theory given in the chapters set must be carefully studied. There is no necessity to add to what is there said. One or two of these sums are generally to be found on the paper. Note such a question as, "By what must 42525 be multiplied to make a perfect square?"

Split the number up into prime factors $= 5 \times 5 \times 9 \times 9 \times 3 \times 7$, or $5^2 \times 9^2 \times 3 \times 7$. Now it is evident that to complete the square another 3 and another 7 are needed. Hence the answer is 3×7, or 21.

Algebra.—Care must be taken with this section of the work. The establishing of identities is a common question. There is a particularly good selection of types given.

Geography.—In addition to the revision work set, all students should take a year's papers previously given, and prepare answers where necessary.

History.—The period from 1760 to 1800 is a very important one in English history, especially in respect to the expansion of the empire. The closing years of the Seven Years' War were years of great activity, acquisition of territory, and glory to England. It was the finish of the duel between France and England for the possession of the New World. The singularly blind policy of the ministers led to the revolt of the colonies, and France saw her way to revenge defeat by depriving us of our oldest possessions: if we had gained Canada, we should lose the States. In India, under Hastings, our empire was further extended. The No Popery riot was a mere bubble which indicated the gradual working of the minds of the people towards emancipation. The interest of the final years of the century centres round the French Revolution. Note carefully the causes which led to it—the continuation of feudal ideas long after the age of them had passed away. French society had, against nature, been made to consist of the privileged and wanton nobles and the tax-paying, ground-down peasantry. There was no middle class. The whole structure was unduly balanced, and came down with a crash. How was this avoided in England? To answer this we must go back to the Peasants' Revolt and consider its effects; note the gradual growth of a great middle class—the sturdiness of the parliament in their opposition to the king culminating in the glorious Revolution of 1688. *We* proceeded gradually, the revolution extending over some three centuries.

Test Questions.

1. Penmanship.
   Large Hand:—*Algebraical.*
   Small Hand:—*The fairest action of our human life*
   Is scorning to avenge an injury.
2. Give some account of the trade of the West Indies—the effects of the emancipation of slaves on prosperity.
3. Explain the method of government of the United States.
4. Explain clearly why the calendar needed reforming, how the reform was effected, and what provision was made that mistakes should not occur in the future.
5. Name the following relations of the minor (or *Lah*) mode: (*a*) dominant, (*b*) minor or essential sixth, (*c*) leading note or essential seventh, (*d*) supertonic.
6. Put into French:—"Do this at once;" "That is not right;" "This is the man to whom I spoke;" "We met your carriage and that of your brother."
7. Mention some frequent symptoms of influenza, and describe the treatment suitable to that complaint.

CORRESPONDENCE: RULES.

To ensure an answer in the next issue, queries must be sent by the 15th of each month.

Name and address of sender, with coupon of current number of THE PRACTICAL TEACHER (and *nom de plume* if desired), must be enclosed.

As a rule, all replies will appear in the Correspondence Column; but any one desiring an immediate reply may obtain it by enclosing a stamped addressed envelope.

All communications and queries with regard to the PUPIL TEACHERS' AND SCHOLARSHIP COURSE should be addressed to "Mr. A. T. FLUX, The Bays, Belvedere, Kent."

ANSWERS TO CORRESPONDENTS.

Oak.—Drawing, 17/20. Lining-in much too hard and wiry; flowing smooth curves essential.

Lucie.—Penmanship, 40/60. Small hand much too small. The pen is held sideways, and this spoils the writing. Essay, 55/60. Chief defect, a stiffness of expression.

H.J.—If the pearls cost as many times the casket as the diamonds did the pearls, their values are evidently in continued proportion, as—1 : 2 :: 2 : 4, or 1 : 3 :: 3 : 9, or 1 : 4 :: 4 : 16. If you examine these proportions, you should see that the centre term is the square root of the product of the extremes. Hence multiply the cost of the casket by the cost of the diamonds (in shillings), and take the square root of the result. This will give you the cost (in shillings) of the pearls.

Ina.—You will find the simplest arrangement in the *Methodic Maps*, published at this office.

Transvaal.—Watch your paper. The crisis is still acute, although Kruger has conceded several points.

Aids.—Essay, 10/20. Not enough graphic description. You should write an account of an actual, not theoretical, visit. Penmanship, 12/20. Not a good style.

F.G.W.T.—I am not sure. Write the Editor of *The Practical Teacher's Art Monthly*, and enclose stamped addressed envelope for immediate reply.

Urania.—Penmanship, 14/20. Little style, especially in large hand. Analysis correct. I do not think you use the simplest plan. Parsing very good.

Gerty.—Essay, 15/20. Thought good, but the essay is not written on a good, clear plan. Penmanship, 13/20. Practice needed. Pen held improperly.

Grace D.—Essay, 55/60. Very good. Penmanship, 40/60. Irregular in size and slope.

Anxious.—Analysis, 8/10. *Fence* is object of *hath been taught*. Parsing, 7/10. *Fit* is an adjective. Penmanship, 2/10. Very poor. Essay, 30/60. Much more care needed; avoid colloquialisms and express yourself in clear, concise sentences. There is a detailed syllabus for Physiography, 1900.

Greeba.—I know of no case in which the status derived from passing the Q.S. has been granted without examination. If illness prevents this year, it must be taken next.

Hopeful.—Essay, 45/60. More vigorous style needed.

Dorothée.—Adverbial to *is*. *Half* = adjective quantity, limiting *pain*. Essay, 50/60.

Miss M. Farr.—I cannot return your work; no address enclosed.

All other Correspondents answered by post.

OUR CERTIFICATE COURSE FOR 1900.

BY GEORGE COLLAR, B.A., B.SC.,
Head-Master of the Stockwell Pupil Teachers' School.

TEST QUESTIONS ON THE SEPTEMBER WORK.

THEORY OF TEACHING.

FIRST YEAR.—1. In what ways does the spelling of the following words present a difficulty to children? say how you would deal with it: *recommend, accommodate, excelling, concealing, ceiling, seize, conscience, plough, height.*

2. Sketch a three months' course of lessons in word-building for a class just beginning Standard IV. work.

3. What are the parts that go to make up a proposition?

4. What are "indefinite propositions"? Why do they not come within the range of formal logic?

SECOND YEAR.—1. What is meant by "involuntary attention"?

2. How is attention related to the will? Say what steps a teacher can take to train his class in habits of attention.

3. What classes of poetry does Plato regard as unsuitable for educational purposes?

ARITHMETIC.

1. Prove that if the denominators of two irreducible fractions are prime to one another, the sum of the fractions cannot be a whole number.

2. Find a fraction which is not altered in value by adding 16 to the numerator and 20 to the denominator, the L.C.M. of the denominator and numerator being 260.

3. State the rule for finding the G.C.M. of a number of vulgar fractions. Find the G.C.M. of $\frac{35}{39}$, $\frac{14}{15}$, $\frac{77}{78}$.

English.

First Year.—Explain the following:—"Shoot folly as it flies;" "Of this frame the bearings and the ties;" "Blindness to the future;" "What future bliss, he gives not thee to know;" "That equal sky;" "A Borgia or a Catiline."

Second Year.—1. Explain the following:—"From this lady may proceed a gem to lighten all this isle;" "The long divorce of steel falls on me;" "I'll venture one have-at-him."

2. Give quotations from the trial scene (ii. 4) showing Henry's opinion of Katharine and Katharine's opinion of Wolsey.

Geography.

Both Years.—1. Give a summary of the principal changes brought about by the Treaty of Utrecht.

2. Give an account of the origin of the kingdoms of Prussia and Sardinia.

History.

Both Years.—1. What important constitutional principle was established on the occasion of the passing of the Occasional Conformity Bill?

2. What was the object of the Property Qualification Act? How was it evaded, and when was it repealed?

3. Give an account of the campaigns in Spain (1704–13).

Algebra.

Women.—Factorise the following:—

$a^2 + 7a + 10$; $a^2 - 7a + 12$.

$x^2 - 3xy - 70y^2$; $81a^4 - 25$.

$2x^2 + 10xy - 28y^2$; $a^2b + 15ab + 56b$.

Men—First Year.—1. Simplify—

(1.) $$\frac{\left(\frac{x}{2}-\frac{2}{3}\right)\left(\frac{2x-3}{x-1}+\frac{3x-1}{2(x-1)}\right)}{\frac{3(3x-4)}{3x-2}}$$

(2.) $$\frac{a^2}{a^2-1}+\frac{a^2+a-1}{a^3-a^2+a-1}+\frac{a^2-a-1}{a^3+a^2+a+1}-\frac{a^3-a-1}{a^4-1}.$$

2. Find the H.C.F. and L.C.M. of $a^4 + 2a^3 + 9$ and $4a^3 + 11a^2 + 18a + 9$.

Men—Second Year.—1. How many words in which the first and third letters are consonants, but not the same, and the second a vowel, can be formed from an alphabet consisting of 20 consonants and 5 vowels?

2. In how many ways can two crews of 8 each be selected from 16 men, two of whom are brothers, if the two brothers are not allowed to row in the same boat?

SYLLABUS AND NOTES FOR OCTOBER.

English Composition.

Subjects for essays:—

1. The most judicious way to spend a holiday.
2. The study of English literature.
3. The advantages offered by our insular position.

Theory of Teaching.

First Year.—Arithmetic: its practical and educational utility—(1) in business, and for ordinary purposes of life; (2) as affording training in (*a*) abstract thought, (*b*) correct reasoning processes, (*c*) habits of neatness and order, and (*d*) accuracy.

Being the science of number, a correct conception of number is a matter of fundamental importance. Children must be taught to abstract the idea of number from a group of concrete things, just as they abstract the idea of colour, weight, etc.—namely, by comparison. For success in arithmetic, this abstract idea must be imparted in the infant school stage and kept up throughout.

The work of the infant school stage may be taken to include the imparting of this idea, together with the association of numbers with the signs that represent them—notation, the combinations which form the numbers up to 10, the significance of the digits and their local value, and the teaching of addition and subtraction of small numbers. Subtraction should be taught by the method of complementary addition; children will then not only learn the two rules as one, but will find a pleasing variety in the questions, and will be laying a sound foundation for their future work.

Logic.—The relation of propositions to one another. Jevons, Lessons ix. and x.

Second Year.—*Psychology.* Observation. Qualities of a good observer. Power of discriminating between the essential and the non-essential, and recognising the relative importance of parts. Necessity of cultivating the powers of observation of things rather than the recollection of words. The requisites are (*a*) attention, and (*b*) acuteness of the sense organs. The teacher must not only set his class to observe, but must test his pupils' observation. Drawing affords a good test of correct visual observation, but also requires a trained hand. The ordinary "ear-tests" train in observation of sounds, but here again the reproduction of a sound requires a certain amount of voice training. Children should also be asked frequently for oral or written accounts of what they have observed. Object lessons have for their most important function the training of the powers of observation; here they differ from elementary science lessons, in which, although observation holds an important place, the acquisition of knowledge comes more to the front. Correct spelling may be regarded largely as a criterion of the way in which the powers of observation have been trained. In a less degree, also, nearly every lesson may be used to train these powers.

Plato's "Republic."—Having discussed the question of the kinds of poetry to be allowed in the education of the young, Plato proceeds to discuss the question of music. This part is unintelligible to any one who is ignorant of the structure of the Greek modes. We will assume that our readers are familiar with the elements of the tonic sol-fa system, or with the relations between the notes in the open scale of C, and limit our remarks to that. Now, a Greek mode, sometimes translated "a harmony," consisted of an octave of notes; and if it extended from the tonic to the octave above, was called the "authentic form." For example, the Lydian mode extended from F to F^1—

f s l t d^1 r^1 m^1 f^1

Note the semitone between the fourth and fifth, instead of between third and fourth. But if, while keeping F as the tonic or final note, it ranged from C to C, it was called the "hypo-Lydian mode;" and if it embraced the combined compass of these two, it was called the "mixed Lydian mode." Similarly, there were a "hypo" and a "mixed" form of each of the "authentic" modes. In modern music we usually employ either the *major* mode, in which C (or doh) is the tonic, or the *minor* mode, in which A (or lah) is the tonic. Our readers, who are all aware of the great difference in effect between two pieces, one in the major and one in the minor, will now understand the references, especially if they will open the piano and try a few successions of notes in the modes named in the text. They are:—

(*a*) Lydian, from F to F (or fah to fah). Milton refers to this in *L'Allegro*—

> "Ever, against eating cares,
> Lap me in soft Lydian airs."

(*b*) The Ionic, or Ionian, from C to C (doh to doh), which corresponded with the modern major scale.

(*c*) The Doric, or Dorian, from D to D (ray to ray). The Scotch air, "John Anderson, my Jo," is really a melody in the Dorian mode.

(*d*) The Phrygian, from E to E.

The only modes to be employed in education are the vehement, stimulating to valour; and the calm, suggestive of submission. Abolish complicated instruments and their makers, retaining the lyre, the instrument of Apollo, but not the instrument of Marsyas. (The latter was a flute-player who challenged Apollo to a musical contest, and being defeated, was bound to a tree and flayed alive by his opponent.) Plato's support of music is given chiefly to vocal music, and he objects to a flute because a person cannot accompany his own singing with a flute. The reader, in order to understand the importance that Plato attaches to such music as he does allow, must bear in mind the great extent to which music entered into the public and private life of the Greeks. An Athenian could not fulfil his religious duties unless he was able to sing; a new law was not *read* to the people, but *sung;* and many of their athletic exercises were simply musical drill. Moreover, Plato requires that music shall be subservient to the sentiment of the words with which it is associated, and emphasise and adorn it. So also the metre of poetry should be in accord with its sentiment.

All artistic productions have a good effect on the moral character, so that not only poets but workmen must have artistic training. But a musical education is of the utmost importance, because rhythm and harmony enter in the strongest manner into the inmost recesses of the soul, and affect it in the most powerful way. Education in music gives one the power of appreciating the good and beautiful, and leads to a more perfect enjoyment of life. Beauty of outward form corresponds with beauty of soul, and music should lead up to a love of the beautiful.

English.

First Year.—1. Words borrowed from French. (*a*) Before 1350. The introduction of these words was one of the effects of the Norman Conquest, and the fact that during this period the upper classes spoke Norman French and the lower classes English, is clearly shown by the large number of words of this class referring to law and government (*prison, judge, crown, reign*), to church and military matters (*cloister, prayer, armour*), and to the life and amusements of the upper classes

(*mutton*, *beef*, *falcon*, *venison*). Notice that the living animals were called *sheep* and *oxen* by the Saxons who tended them, but their flesh *mutton* and *beef* by the Normans who ate it. (*b*) From 1350 to 1660. Words introduced, not by Normans living here, but from Continental French. These words were mostly of literary origin, and are difficult to distinguish from words introduced directly from Latin (*fraternity*, *deception*). (*c*) From 1660 to present time. These words retain the marks of their foreign origin, being written and pronounced as in French (*fête*, *rouge*, *trait*, *soirée*).

2. Words of Greek origin. (*a*) Up to the revival of learning most Greek words came through Latin and French (*apostle*, *bishop*, *surgeon*). (*b*) Words of recent introduction: these are mostly scientific terms (*telephone*, *acoustic*). The Greek suffix *-ise* or *-ize* is added to roots from any source to form verbs (*subsidise*, *anglicise*): such words as *baptise*, *monopolise*, are of true Greek origin.

Prepare also an account of the introduction of Celtic and Scandinavian words.

Prepare *Essay on Man* to end of Epistle I.

173–206. Man's discontent with his lot, and desire to appropriate the peculiar excellence of every other creature, whereas these special powers would be inconvenient if used in other associations than those in which they are found.

181. *Compensated*. Note the accent in Pope's day.

183. The modern theory of evolution explains how any one particular faculty which proves serviceable to an individual and helpful in his struggle for existence tends to become more and more developed in succeeding generations.

185. *Happy in its own* (state). The noun must be supplied from line 183.

193. *Microscopic*. The modern meaning is, "extremely small, requiring a microscope to make it visible;" but here the word means, "magnifying like a microscope does."

195. *Finer optics*—more powerful eyes. The word is now only used in a humorous sense to denote the eyes.

200. *Aromatic pain*. Some substances, such as strong ammonia, not only have an odour, but cause pain when smelt. The pain is, however, quite distinct from the odour. The odour is perceived by means of the olfactory nerves, which are distributed over the moist membrane lining the nose. In addition to the olfactory nerves, the nose is supplied by a branch of the fifth pair, which is sensory in function. Hence the impression of the odour travels to the brain by the olfactory nerve, and the painful sensation by the fifth pair.

195–200. All this is governed syntactically by "say what the use," and requires considerable expansion in paraphrasing.

202. *Music of the spheres*. It was a common opinion of the ancients that the spheres revolved in their courses to music. (See *Merchant of Venice*, Act v., Scene 1, lines 60–62, and Dryden's *Ode on St. Cecilia's Day*.)

204. *Zephyr*—the south-west wind. Zephyrus was the god of the south-west wind.

207–232. Man's reason is equal or superior to the whole assemblage of sensory powers and instincts found in the lower animals. This must not be too minutely criticised by the psychologist.

215. *Of hearing*. Pope apparently confounds the power to hear sounds with the ability to produce them. As the production of sounds is largely a matter of imitation, to a certain extent this is true; but it by no means follows that fish are deaf.

219. *Nice*—particular, attentive to small matters. The word is generally used now in an objective instead of a subjective sense.

227. *Join*. In Pope's time this word was pronounced so as to rhyme with "line"—a pronunciation still retained in some provincial districts. Compare (*a*) *Rape of the Lock*, Canto iii., lines 29,30—

> "Straight the three bands prepare in arms to *join*,
> Each band the number of the sacred nine."

(*b*) Gray's *Bard*, lines 47, 48—

> "With me in dreadful harmony they *join*,
> And weave with bloody hands the tissue of thy line."

230. *These to those*—that is, some to others.

234. *Quick* = living.

247–250. The meaning is: Since the whole universe is a collection of systems, just as each system is a chain of parts, it follows that if there be any confusion in one of the systems, not only will that system fall to ruin, but its ruin will involve that of the universe of which the system is a necessary part. This is an amplification of the old story: "For want of a nail the shoe was lost; for want of a shoe the horse was lost; for want of a horse the rider was lost; for want of the rider the battle was lost."

278. *Seraph*—an "exalted one." The singular is not used in Hebrew: the plural, "seraphim," has been introduced, and then the singular, "seraph," formed from it. So that it is not quite correct to say that "seraphim" is formed from "seraph" by adding "im;" the converse is the case.

281. *Nor* ORDER *Imperfection name*. Do not call order imperfection. The Greek word "kosmos," which is generally translated "world," really means order, and is opposed to "chaos," which means confusion.

The first Epistle should now be repeatedly read through until it is known almost or quite by heart.

SECOND YEAR.—Prepare to the end of Act iii. As we are at present devoting so much space to the First Year author, we must postpone the discussion of *Henry VIII*. Read carefully through *The Tempest*, and make a running analysis of it.

ALGEBRA.

WOMEN—BOTH YEARS.—Continue the study of factors, and carefully study the chapter on simple equations. The danger in working equations lies in their extreme simplicity, and students frequently get into a mechanical way of working. Remember that although the principles by which equations are solved are very simple, yet no step should be taken in solving an equation without referring mentally to those principles. Never talk about "bringing a term over and changing the sign," but always regard the action as the addition (or subtraction) of an equal quantity to each of the two equal quantities.

MEN—FIRST YEAR.—Algebraical fractions: the ordinary rules, including simplification. Great care is necessary to prevent confusion of signs in dealing with fractions. Remember that the sign written before a fraction applies to its value *as a whole*. Thus, $-\frac{12}{3} = -4$; but had the sign applied to the numerator and denominator separately, the result would have been $+4$, because $-12 \div (-3) = +4$. The difficulty is generally greatest when there are several terms in the numerator and several in the denominator, and in the course of our work we have to regard the numerator and denominator as separate quantities. The difficulty is removed if we adopt the following rule: Always treat the denominator as positive, and regard the sign as affecting the numerator alone. If either term of a fraction be multiplied by -1, the sign of the whole fraction is altered: thus, $-\frac{12}{3} = -4$, but $-\frac{12}{-3} = +4$. But we may multiply the denominator by -1, and then multiply the whole fraction by -1, and thus leave the original value unchanged: $+\frac{12}{-3} = -4$. So,

$$+\frac{a}{b} = -\frac{a}{-b}; \quad +\frac{a}{x-y} = -\frac{a}{-x+y} = -\frac{a}{y-x}.$$

It frequently happens that the denominators of two fractions in an expression may be reduced to the same form by applying this principle:—

$$\frac{x}{a-b} + \frac{y}{b-a} = \frac{x}{a-b} - \frac{y}{a-b} = \frac{x-y}{a-b}.$$

MEN—SECOND YEAR.—Read through the chapter on the binomial theorem, involving only integral indices. The universal proof of this theorem depends upon a logical process known as mathematical induction (see Todhunter's *Algebra for Schools and Colleges*)—the argument being that if the rule can be shown to be true for n, and also to be true for $n+1$, *because* it is true for n, then it must be true universally, if by trial it is found to be true in a particular case.

EUCLID.

WOMEN—FIRST YEAR.—To end of Prop. 26. Notice how 24 and 25 are related to 4 and 8 respectively. Prop. 26 requires careful attention; observe that in each of the two cases we have one side of one triangle given equal to one side of the other, and by the negative method we prove that there must be another side equal. We are then in a position to prove both cases by I. 4.

WOMEN—SECOND YEAR.—Finish Book I.

Prop. 47 is a little bit difficult, but very important, and requires close attention. In 48 be careful *not* to produce one of the sides, but to draw the line at right angles to the other.

MEN—FIRST YEAR.—To end of III. 22.

MEN—SECOND YEAR.—To end of VI. 10.

LATIN.

FIRST YEAR.—Principal parts of verbs of the third conjugation.

SECOND YEAR.—Syntax of the genitive case.

BOTH YEARS.—Follow THE PRACTICAL TEACHER Matriculation Course in Latin author and composition.

FRENCH.

FIRST YEAR.—Irregular verbs of the first and second conjugations. *Voyage au Centre de la Terre*, chaps. xvi.–xxi.

SECOND YEAR.—Use of the subjunctive mood. *Le Roi des Montagnes*, PRACTICAL TEACHER edition, with Exercises 1–6 at the end.

Geography (both years).

Before studying the geography of Europe in detail, compare a map of Europe showing the main divisions of the Continent after the Peace of Utrecht with one showing the countries as divided at the present day.

Study position and boundaries of Europe, and mark in an outline map the various details to be remembered. Compare Europe in area with the other continents. Endeavour to get a bird's-eye view of the whole continent before attempting the geography of individual countries.

In studying the build of Europe, note:—

1. *A belt of highland in the south*, extending from the shores of the Atlantic to the Caspian, through the Iberian Peninsula, France, Italy, Switzerland, Germany, Austria-Hungary, and the Balkan Peninsula.

Study the geography of the mountain system in each country, and get up a concise account of the Alps, noting the passes and tunnels. Consider the effect on the trade of Marseilles and Genoa of the making of the Mont Cenis and St. Gothard tunnels.

Note that coal and iron are abundant in the Erz Gebirge, Riesen Gebirge, and Harz Mountains in Germany, and that consequently manufactures are established in Saxony (iron, textiles), in Silesia (linen, wool), and in Rhenish Prussia (steel, textiles).

2. *A belt of highland in the north*, including the highlands of Scandinavia, the Grampians and other mountains of Great Britain, as well as the forest-clad Valdai Hills in Russia.

Compare the highlands of Scandinavia with the Alps with respect to glaciers, lakes, pine woods. There is no definite mountain range in Scandinavia, the heights being rather broad plateaus topped with moor or snowfield.

3. *A more or less level area* lying between the two highland regions, and constituting the Central Plain, or Low Europe. This great plain stretches from the Urals through Russia, and parts of Germany, Denmark, Holland and Belgium, France; and, though interrupted by the North and Irish Seas, is continued through South Britain and Ireland.

Besides this Central Plain, there are in Europe:—

The *Plain of Hungary*, or Plain of Middle Danube—great grain-growing district.

The *Plain of Wallachia and Bulgaria*, or Plain of Lower Danube—pastoral and wheat-producing plain.

The *Plain of Lombardy*, or Valley of Po—one of the most fertile parts of the world, famous for large and wealthy cities, and for the production of silk and wine.

The *Plain of Andalusia*, or Valley of Lower Guadalquivir—famous for fruits, wine, quicksilver.

Trace the water-parting of Europe from the Urals, south-west through Valdai Hills to Gibraltar: the south-east slope is wider than the north-west, hence longest rivers flow to southern seas.

Note advantages in European river system:—

1. Rivers are numerous, nearly all are navigable for a greater or less distance, and many form excellent harbours at their mouths.

2. Rivers flow from common centres in different directions, and thus bring the same inland region into communication with far-distant seas.

3. The chief rivers, and hence different seas, are connected by canals.

Trace in an outline map the courses of the chief rivers, and get up a description of the Rhine, Danube, Volga: these three, with the Thames and Mersey, are the great commercial rivers of Europe.

Note that Volga and Ural are rivers of inland drainage.

The Alpine, Scandinavian, and Russian lakes are the chief groups in the Continent.

Study the climate, noting the chief characteristics:—

Of Southern Europe—comparatively equable temperature; seasons of alternate rain and drought.

Of Middle and Western Europe—contrasts of heat and cold more marked, as well as seasons of spring and autumn.

Of Northern and Eastern Europe—extremes of heat and cold becoming greater as latitude increases; spring and autumn becoming shorter in duration as the north is approached.

Study the governments of Europe; the inhabitants, and their religion.

History.

Both Years.—1714–27. Read Thackeray's account of George the First in *The Four Georges*. Learn the genealogical table connecting the Hanoverian and Stuart Houses, and remember that George the First owed his accession to the English throne mainly to the support of the Whigs, the more advanced Tories being in favour of the Pretender.

Home Affairs.—George at once appointed Whigs to all the high offices of state, but finding that he had less power than he had expected to have, and being unable to understand the deliberations of the Cabinet, he ceased to attend. Hence the need of an acting president was felt, and in this reign the position of *Prime Minister* came into existence; and Walpole may be regarded as our first Prime Minister, although he held the lead among his colleagues for some time before he was officially recognised as in any way differing from the other ministers. The general election of 1715 resulted in a Whig majority; but such was the strength of the Tories in the country, that the Whigs deemed it expedient to get rid of some of the Tory leaders. Certain secret agreements in connection with the Treaty of Utrecht were made the grounds for impeaching Bolingbroke, Ormond, and Oxford. The two former fled to France, and Oxford was sent to prison for two years. Remember the particulars of the rising in favour of the Pretender (1715–16):—Mar in Scotland, Forster in north of England; battle of Sheriffmuir; the Pretender lands, 2nd December, at Peterhead, enters Dundee 6th January, and on 5th February escapes with Mar on a French ship.

The Septennial Act, 1716. After the Pretender's invasion, the Whig government was seized with evil forebodings with respect to the probable results of the next general election, which was due in the beginning of 1718. They accordingly brought in and passed a Bill to extend their own life and the life of any future parliament to a maximum period of seven years. Reflect now on the other laws dealing with the duration of parliament:—(*a*) First Triennial Act, 1640. After Charles the First had ruled eleven years without calling a parliament, this Act directed that a parliament should meet *at least every three years*. This was repealed in 1664. (*b*) Second Triennial Act, 1694. This *limited the duration of parliament to three years*, thus preventing the king from retaining a parliament which happened to be favourable to himself for as long a time as he pleased. This was repealed by the passing of the Septennial Act of 1716. There have been unsuccessful agitations at various times in favour of shorter parliaments—for example, the Chartists in 1837–40 demanded annual parliaments.

Repeal of the Occasional Conformity Act and of the Schism Act, 1719.

The South Sea Bubble, 1720–21. The mania for speculation, and its results. Confidence restored by Walpole; his rise in power.

Wood's Halfpence, 1724, the occasion of Swift's satire in *The Drapier Letters*.

Foreign Affairs.—During this reign our relations with foreign countries were peaceful. Louis the Fourteenth died in 1715, and was succeeded by his great-grandson, Louis the Fifteenth, a weakly little boy of five, who was not expected to live long. After him the next nearest male relative of Louis the Fourteenth was Philip the Fifth of Spain, who had renounced his claim to the French throne; and the next was Philip, Duke of Orleans, the Regent. Each of these hoped to succeed. Dubois, one of the leading French ministers, pressed upon the Regent the similarity between his position and that of George the First. Philip the Fifth could be kept out of France only by an English alliance, and the Pretender could be kept out of England by an alliance with France. Hence the policy of Louis the Fourteenth was reversed: Dubois met George the First and Stanhope on their way to Hanover, and after considerable difficulty concluded a treaty of alliance in which Holland, and afterwards Austria (1718), joined. So anxious was Dubois to secure this treaty that he even allowed the title "King of France," which George the First had assumed, and promised to expel the Pretender from France. Thus the deep-laid schemes of Alberoni, the Spanish minister, were frustrated; for when action was taken, Admiral Byng destroyed a great part of the Spanish fleet at Cape Passaro, on the coast of Sicily, and the rest, together with the naval ports of Fontarabia, St. Sebastian, and Centena, were destroyed by combined French and English troops. Great Britain and Austria gained considerably by this war.

Arithmetic.

Decimals.—The following theoretical points require very careful study:—

1. Determination by inspection whether a given vulgar fraction will generate a terminating or a recurring decimal. If the former, the number of digits in it; if the latter, whether pure or mixed, and the number of digits in each part.

2. Proof of the rule for converting a recurring decimal to a vulgar fraction.

3. Determination of the denominators of all the vulgar fractions which will generate a decimal with a given number of recurring digits.

4. Short methods of completing the period of a decimal after doing the first part of the work.

5. Proof of the rules for multiplication and division of decimals.

6. Operations with recurring decimals, without bringing them to vulgar fractions.

OUR SCIENCE SECTION

☛ **Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this Number.**

THE SCIENCE AND ART DIRECTORY FOR 1900.

THE issue of this yellow-backed annual by the Science and Art Department is awaited even more anxiously by science teachers than its blue-backed prototype, the Code, is looked for by teachers in primary schools. And for this there is very good reason, seeing that the South Kensington authorities do not hesitate to bring all their changes into immediate action, whereas the Whitehall branch of the Committee of Council, more considerate of the disorganisation resulting from lightning changes, gives a year's notice of impending new departures. It would be well if Sir George Kekewich, now that he is at the helm, would insist upon uniformity of procedure with respect to both the Directory and the Code in the gradual introduction of innovations.

How to do it.—Strange to say, there is some indication of a change in the required direction, since a loose sheet is issued with the Directory to the following effect:—

"The Lords of the Committee of Council on Education have under consideration the assessment of the efficiency of instruction in the elementary stage of science and art subjects by inspection only: it is proposed to discontinue examinations, as a test for the purposes of assessing the grant in that stage, after the year 1900.

"It is proposed that papers shall continue to be set in that stage for students who may desire to be examined and to possess a certificate of having passed the examination; but that in those cases a fee should be charged to cover the cost of examination."

We note with pleasure this further replacement of examination by inspection, and we acknowledge the wisdom of the Department in making this important announcement thus early.

How not to do it.—But we must not indulge too much in congratulation, seeing that there is the inevitable "bolt from the blue" in the shape of the following announcement concerning schools of science: "*Students under twelve years of age on the 1st of August of the school year for which the claim is made, unless specially allowed by the inspector, must be excluded.*" The same regulation is also binding on science classes.

Hitherto it has sufficed that the school of science student should have passed Standard VI.; and as the schools had been at work at least a month before the issue of the Directory, it is evident that some undesirable disturbance is certain to result from this tardy declaration of an age qualification. This we say without prejudice as to whether or no a child under the age of twelve should be admitted into a school of science. We advise all those of our readers who may be adversely affected by the change to bring this fact of the belated appearance of the order under the notice of the inspectors, who should allow the claim for the inclusion of the under-twelve children in the school of science on this ground alone, provided the qualifying examination in the subjects of Standard VI. has been passed.

The Price of the Directory.—It is very interesting to note that the Department seemed to be in doubt as to whether or not the old price of 6d. should be increased to 1s. 11d. The latter price is printed both on the cover and on the flyleaf, but a pen-and-ink correction restores the figure to the usual 6d. It would be good to know the history of this little slip and its correction; and the Department, always so very censorious when a *lapsus* is made by manager or teacher, will do well to recollect that it is human for even the Science and Art Department officials to err.

Alterations.—In addition to the changes to which we have already drawn attention, there remain others to be noticed, of which the alterations of the syllabuses in chemistry (elementary theory) and metallurgy (elementary practice) are perhaps the most important. In chemistry, the recasting of the syllabus seems to have great attraction for the Department, seeing that it goes into the melting-pot with a frequency that must be just as galling to the teacher as it is to the publishers of text-books of science. The modifications which appear in the current syllabus consist in the exclusion of the halogens other than chlorine, except that "bromine and iodine are to be merely exhibited and their vapours shown," and the inclusion of the metals concerning which it is required to show by experiment their power to form a basic oxide. Experiments are outlined, and a kind of outline of notes of the lessons that are to be given is added. The syllabus is rather vague, but, read with even the smallest amount of liberality, it certainly includes much more than was required in previous syllabuses. Practical mechanics (Subject VI.) and practical physiography (Subject XXIII., Section 1) have been added to the list of subjects for which a payment for practical instruction in a laboratory may be claimed.

Art Syllabuses.—There is not much change to be recorded here, but there are certain points which appear to be confused. Our readers will perhaps remember that a circular was sent out about three months ago which practically abolished freehand drawing of ornament as a double subject—namely, 2 B of Group I. and 3 B of Group II. In place of these two subjects was, and is, substituted a single subject—namely, drawing from photographs of casts. In the same circular, model drawing, as a separate subject for each of the two groups, was abolished; so that 3 A of Group I. and 5 A of Group II. became one subject, which practically has the old syllabus 5 A for its curriculum. It is, in the face of this fusion of subjects 2 B and 3 B on the one hand and subjects 3 A and 5 A on the other, somewhat confusing, to say the least of it, for the old grouping to be retained, as it is in the sections dealing with payment upon attendance, where it is difficult to determine whether the higher or the lower rate of payment will rule in the case of the new amalgamated subjects which take the place of the old separate ones. It is equally confusing for school of science students to be told that in the advanced courses they may take "any subject of art which may be approved by the Department except freehand (2 B), geometrical drawing, and elementary modelling." Considering that there is no 2 B, this clause is meaningless. The question is whether or not such students may take the new amalgamated freehand course that has replaced 2 B and 3 B.

Group I. by Proxy.—Provided special permission has been given, instruction in the first group of art subjects may be given under an unqualified teacher, if such teacher is under the tutelage of an art master who himself gives not less than twelve lessons during the session. If less than twenty-eight lessons are given in any one session, reduced payment alone will be made, and this only by special favour.

Practical Instruction essential.—Day classes for

teachers, under either the Education or the Science and Art Department, can only be held under the same terms as evening classes when "practical instruction is given in at least one subject of science in which instruction in the theory is also given."

Visits of Instruction. — Classes visiting museums, galleries, etc., under the guidance of their teachers, may register such attendance when all the arrangements are previously submitted to and approved by the inspector. It should now become the rule, and not the exception, for classes within reasonable distance of museums to have a goodly number of lectures at the fountainhead.

Late-comers.—December 1 and February 1 are the last days upon which students can be accepted if their attendances are to be counted for the current year. In order not to set the faces of teachers quite against belated applicants for admission, "the attendance made may be carried forward to augment the claim for next session."

School of Science Students and Registration.—"No student in a school of science may be registered for ordinary attendance grants in any subject of science;" and again, "No student in a school of science may be registered for an attendance grant in Group I." Advanced course students of a school of science may, however, be registered in the evening for an attendance grant for subjects beyond Group I., provided they are not receiving instruction in any art subject beyond Group I. in a school of science. Students who take two years in the school of science for their elementary course cannot be registered at all for the elementary stage of their obligatory subjects: they may be registered for one year if they took but one year for their elementary course; and the same rule holds good with respect to advanced course students, who may register for one year if they took only one year for their advanced course in the school of science. "A student on whom an attendance grant has been paid in a school of science is ineligible for registration in Section I. of the elementary stage of Subject XXIII., Physiography."

The Overhauling of Accounts.—"The inspector may require the production, if necessary, of such accounts as relate to the receipts and expenditure in respect of subjects aided by the Department;" and in the case of schools of science, it is a condition of recognition "that a statement of the income and expenditure of the school for the period corresponding to the recognised school year be furnished to the Department."

"Students taking the elementary course are not allowed to sit at the May or June science and art examinations; and students taking the advanced courses cannot be examined in the elementary stage of those subjects in which they are required to be instructed in the advanced stage. Exceptions to this rule can only be sanctioned in special cases, upon application previous to the examinations."

There are a few minor changes that have not been referred to, but from what has been said, our readers may see that the policy of the Science and Art Department has undergone no change, notwithstanding the appointment of Sir George Kekewich to the Secretaryship; whereat one needs be neither surprised nor despondent, as Sir George is wont to be wary, and to do his spiriting gently. There can be no doubt that he will ultimately leaven the mass, and that future Directories will show.

CHEMISTRY NOTES.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

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Purification of Iridium.—M. E. Leidié read an interesting paper before the French Academy of Sciences on a method of obtaining pure iridium. He converts the metal into chloride, and acts upon this with sodium nitrite. Iron and lead are first precipitated as oxide, and gold as metal, the solution then containing the osmiate of sodium and the nitrites of ruthenium, rhodium, and iridium. Ruthenium and osmium are got rid of as volatile peroxides. Rhodium and iridium are acted upon by sodium chloride, whereby double chlorides with sodium are formed; the separation of these compounds is a very easy process.

Electrolysis of KHF_2 in a Copper Voltameter. — The classical experiment whereby Moissan succeeded in isolating fluorine has been performed by very few chemists, in consequence of the expensive platinum voltameter that hitherto has been considered necessary to the successful preparation of the element. It is, therefore, very satisfactory to announce that the great French chemist has obtained very good results whilst substituting copper for platinum in the apparatus. Owing to the fact that copper becomes coated with a thin protecting layer of copper fluoride, this metal is less attacked by fluorine than most others; the fluorine thus formed being insoluble in hydrofluoric acid, further action is prevented. The temperature must not be too low to prevent the union of the hydrofluoric acid and the alkaline fluoride from taking place throughout the whole mass. By means of this apparatus Moissan obtained a continuous current of gaseous fluorine.

Arsenides of Ca, Sr, Ba, and Li.—M. Lebeau has prepared the arsenides of these metals by reducing the arseniates of the alkaline earths by carbon at the temperature of the electric furnace. The compounds thus formed resemble, both in their composition and in their properties, the nitrides and phosphides of the group that were prepared by Moissan. This will be seen from a comparison of the reactions that take place when the nitrides, phosphides, and arsenides of calcium are acted upon by water:—

$$N_2Ca_3 + 6H_2O = 3Ca(OH)_2 + 2NH_3.$$
$$P_2Ca_3 + 6H_2O = 3Ca(OH)_2 + 2PH_3.$$
$$As_2Ca_3 + 6H_2O = 3Ca(OH)_2 + 2AsH_3.$$

Lithium arsenide is the only arsenide of the alkali metals which is sufficiently stable to be prepared by the electric furnace.

Combination of Nitrogen with Oxygen.—M. Berthelot, in purifying argon from nitrogen, made some interesting observations concerning the combination of oxygen with nitrogen under the influence of the electric discharge. He found that gaseous nitrous oxide (N_2O) is always formed first, even in an excess of oxygen. The monoxide is converted into the peroxide very slowly. Nitric oxide (NO), formed by the action of the electric discharge on a mixture of oxygen and nitrogen, combines first with one atom of oxygen to form nitrous anhydride (N_2O_3), according to the equation

$$2NO + O = N_2O_3,$$

after which it unites with another atom of oxygen to form nitrogen peroxide—

$$N_2O_3 + O = 2NO_2.$$

Reactions between Sodammonium and Potassammonium and Sulphur and Tellurium. — M. Hugot has ascertained that when the alkali is in excess the following compounds of sulphur and tellurium are formed: Na_2S, K_2S, Na_2Te, K_2Te. These compounds are all white amorphous substances which dissolve in water, but are insoluble in liquid ammonia, and incapable of absorbing ammonia gas. When there is an excess of sulphur or tellurium, the compounds formed are Na_2S_3, K_2S_3, Na_2Te_3, K_2Te_3 respectively, all of which dissolve in both water and liquid ammonia, and absorb gaseous ammonia. They are white crystalline solids.

The Preparation of Argon from Air.—The experiments of Ramsay, in his classical separation of argon from air, will be fresh in the minds of our readers, who will also remember that the prime difficulty consisted in the elimination of the nitrogen of the air. To ensure this, Professor Ramsay used large quantities of metallic magnesium. Other experimenters had relied upon the absorptive power for nitrogen of bodies other than magnesium. For example, lithium was employed by Ouvrard, and a mixture of lime and magnesium was the absorptive agent used by Maquenne. Dr. Hempel, who has been studying this question, has devised a much more effective absorptive agent in the shape of a mixture of calcium, magnesium, and sodium, in the proportion of 1 gram of finely-divided magnesium to 5 grams of coarsely-powdered lime and 0·25 grams of sodium. The proportions between the amounts of nitrogen absorbed in a given time by magnesium, lithium, lime-magnesium, and lime-magnesium-sodium were 1 : 5 : 8 : 20. Future experimenters will doubtless be grateful to Professor Hempel for his valuable discovery.

Victorium: a New Element.—At the 1898 meeting of the British Association, Sir William Crookes, the president, announced that he had discovered a new chemical element associated with yttrium, to which he gave the name monium. Sir William has continued his researches on the substance, and on the 4th May he read an exhaustive paper on the subject before the Royal Society, which is reproduced in *The Chemical News* and in *Nature*. The Honours student is recommended to carefully read the paper, as it not only gives the evidence in favour

of the elemental nature of the new body, to which the discoverer now wishes to give the name victorium, but also shows clearly the method pursued by the accomplished chemist in his research. It may be mentioned that Sir William Crookes has been working at this research for twenty years. Starting with crude yttria, the first operation is to free the raw material roughly from the earths of the cerite group—the separation depending on the fact that the double sulphates of potassium and the yttrium metals dissolve readily in saturated potassium sulphate solution, whereas the corresponding double sulphates of the cerium group dissolve with difficulty in this solvent. The crude yttria is now converted into nitrate, which is uniformly heated until red vapours are given off, when the fused mass is poured into water and well boiled. As a result a basic nitrate of yttrium is precipitated, whilst the normal nitrate remains in solution. The two are separated by filtration. The basic nitrate is dissolved in nitric acid, and the two solutions—namely, the filtrate and the dissolved precipitate—are evaporated and fused as before; whereupon each is divided into a soluble and an insoluble portion, the soluble portion of the solution of basic nitrate being added to the precipitate of the normal nitrate. By this means solutions containing sensible quantities of victorium are obtained, as is shown by spectroscopic examination in a radiant matter tube; but in order to show the lines due to victorium distinctly, further fractioning takes place by the agency, first, of oxalic acid, and, lastly, of potassium sulphate. Without the diagrams that accompany the author's paper, it is not possible to give a clearer account of the process, but enough has been said to outline the method adopted. Further particulars may be got from the publications named above. In conclusion, supposing the oxide to be Vc_2O_3, the atomic weight of victorium is, according to Sir William, not far from 117.

The Sulphocarbonates of Ammonium and Potassium.—The former of these two salts is prepared by digesting freshly-precipitated ammonium sulphide with one-twentieth of its weight of CS_2 for twenty hours at a gentle heat. The sulphocarbonate is separated from the unaltered CS_2 by decantation.

The potassium compound is prepared by saturating one-half of a 5 per cent. solution of potash with sulphydric acid, to which, after saturation, is added the other half, and digesting at a gentle heat with one twenty-fifth its volume of CS_2—the result being a deep orange-red coloured body, the sulphocarbonate, which is separated from the undissolved sulphide of carbon.

The Colorimetric Estimation of Nickel.—The sulphocarbonates thus prepared are used as reagents for the estimation of the amount of nickel present in steel, quantities of 1 to 3 per cent. being used to increase the tenacity of the steel used in the manufacture of armour plates and heavy guns.

To a 100 c.c. of the solution of the nickel containing not less than 2 milligrams of the metal, 10 c.c. of the reagent are added, whereupon a red coloration results, which is compared with previously prepared comparison tubes containing a known percentage of nickel, and by this simple means the quantity of nickel present in a given specimen of nickel-steel is ascertained.

Volumetric Estimation of Zinc.—M. Pouget, in *Comptes Rendus* for 1st July, gives the following simple method of accomplishing the above estimation:—The zinc solution is precipitated completely by sulphuretted hydrogen. To the sulphide of zinc thus obtained is added a known quantity of iodine solution, the excess of which is titrated with thiosulphate solution—

$$ZnS + 2I = ZnI_2 + S.$$

The reaction is complete at the end of a few minutes. Care must be taken to avoid filtration and wasting of the zinc, so that the excess of H_2S is disposed of by boiling, instead of by filtration, as in the usual practice.

Volumetric Determination of Copper by $K_2Mn_2O_8$.—The copper is brought into solution as a sulphate, either by dissolving it in H_2SO_4, or by the evaporation of its solution with H_2SO_4. The greater part of the free acid is neutralised by ammonia; the solution is warmed, and H_2SO_3 is added until the solution smells strongly of the reagent, and then is added a slight excess of ammonium or potassium thiocyanate, when the copper is precipitated as thiocyanate. The solution is filtered through asbestos, using the pump, and is then well washed. The precipitate and the filter are now thrown into the beaker in which the precipitation was made, and treated with a solution of KOH or NaOH, whereupon double substitution takes place—

$$2CuSCN + 2KOH = Cu_2(OH)_2 + 2KSCN.$$

The $Cu_2(OH)_2$ and the filtrate are again placed in the same beaker, and an excess of ferric chloride or ferric sulphate (free from HNO_3, free Cl, or ferrous salts), together with a little dilute H_2SO_4, is added. The copper oxide reduces a corresponding amount of iron from the ferric to the ferrous condition—

$$Cu_2O + Fe_2Cl_6 + 2HCl = 2CuCl_2 + 2FeCl_2 + H_2O.$$

The beaker is warmed and stirred until the whole of the Cu_2O dissolves, when the solution is poured through a perforated platinum disc, and the asbestos which stays behind upon it is washed with water to which is added a little H_2SO_4 and a little Fe_2Cl_6. The solution is then titrated with permanganate. The iron equivalent to the permanganate used, multiplied by 1·125, gives the weight of the copper in the sample.

NOTES ON ADVANCED AND HONOURS PHYSIOGRAPHY.

The Perseids.—Mr. W. F. Denning—most assiduous of meteor observers—contributes a very readable article on these August meteors to the September number of *Knowledge*. The shower was not more than usually brilliant, and the concensus of opinion seems to be in favour of the display on the night of 11th August as the most brilliant. M. Antoniadi, the gifted collaborateur of Flammarion at Juvisy, saw 104 meteors, or 19 per hour, on 10th August, and 138, or 25 per hour, on 11th August. The following remarks will be found interesting:—"In 1898 the maximum occurred on 11th August, and that date certainly furnished a richer display than was observed on any night in 1899. During the recent shower some brilliant perseids were recorded. At Juvisy, on 10th August, at about 12 hrs. 8 min., a magnificent fireball, estimated five times as brilliant as Venus, exploded in Cepheus. At Bristol meteors rivalling Venus were seen on 9th, 10th, 11th, and 12th August. One of them left a streak for 3½ minutes amongst the stars in the northern region of Pegasus. On 10th August, at 10 hrs. 31 min., Mr. T. H. Astbary, at Shifnal, Salop, recorded a perseid which must have been quite as bright as Sirius, for it gave a very brilliant flash at the end of its flight, and left a streak for 20 seconds."

Altitude and Rainfall.—Mr. Symons, whose *British Rainfall* may be regarded as one of our most reliable sources of information on this subject, has been discussing the question as to the effect of altitude on rainfall. His observations were made in the Lake District, the highest station being Sca Fell Pike (3,200 feet), and the lowest Greenside Mine (1,000 feet). Mr. Symons expresses the opinion that "all these cases show that altitude alone has little influence on the amount of rainfall, and that in a mountainous country attention should be chiefly directed to the trend of the hills and valleys in relation to the rain-bearing winds." The rainfall at twenty-nine stations, each with an average fall of more than 100 inches of rain, was arranged according to precipitation, and little indication was apparent in support of the view that rainfall varies with altitude. Thus Seathwaite, with an altitude of 422 feet, has an annual average fall of 135 inches, and Seatoller Common, at an elevation of 2,000 feet, has an average of 126 inches. Likewise, Dungeon Gill and Ullscarp—the former with an altitude of only 311 feet, as compared with 2,100 feet of the latter—have both the same average rainfall.

Balloon Meteorology.—The following figures give the results of an experiment on the temperature of the upper layers of air which was performed in March last by the authorities of the St. Petersburg Observatory. At starting this was – 3°·8 F.; at an altitude of 3,900 metres it was – 29°·6; at 4,925 metres it had fallen to – 41°·3, and at 6,559 metres to – 60°·1; the reading at 6,878 metres was – 62°·9; whilst at 7,223 metres—the highest altitude recorded—the reading was – 61°·4.

A Remarkable Tornado.—Mr. Musick describes in *The Century Magazine* a remarkable tornado that he witnessed in April last at Kirksville, Missouri. When the storm struck the city, he says, "I saw the wheel of a wagon or carriage and the bodies of two persons flying up into the storm-cloud. One house was lifted upwards to a height of over 100 feet, when it seemed to explode into a thousand fragments, which went soaring, whirling, and mingling with the other débris."

The Origin of Tornadoes.—Professor Cleveland Abbe, from a study of the Kirksville tornado, says that generally a west or north-west wind is blowing over the country, with a front of many miles in length, which trends south-west and north-east. This cool north-east wind pushes aside a gentler southerly wind prevalent in the district during the preceding twenty-four hours. Where these two winds meet, the warm southerly wind is suddenly elevated and cooled by expansion, and also by mixing with the north-west wind, a cloud being formed as the result of this along the whole area of the north-west wind. At certain favourable spots the cloud soon becomes so large as to form a special

indraft upwards through its centre, the ascending wind necessarily acquiring a spiral ascending movement. The direction of rotation in this spiral is almost always the same as that of the hurricanes of the Atlantic—namely, counter-clockwise.

Extremes of Barometric Pressure.—This interesting question is discussed in Symons's monthly meteorological magazine for July. The highest recorded barometric pressures are 31·78 inches at Irkutsk, January 14, 1893; 31·72 inches at Semipalatinsk, December 16, 1877; 31·62 inches at Barnaul, December 14, 1877. These figures are traversed by Dr. Wolikof, who maintains that the Barnaul reading of 31·62 inches is the record maximum. The highest readings in the British Isles are 31·108 inches at Ochtertyre, and 31·106 inches at Fort William, both on January 9, 1896. The highest readings in the neighbourhood of London since 1858, in which year Mr. Symons began his series of observations and records, is 30·934 inches, January 9, 1896. The lowest readings are 27·135, on 22nd September, at False Point, Orissa, and 27·332 inches at Ochtertyre, January 26, 1894. The lowest reading, at Camden Square, was on December 9, 1896, when 28·295 inches was recorded.

Blue Ray of Sunrise.—Under the above heading is an interesting letter to the editor of *Nature* from Lord Kelvin, who for the last five or six years has been wishing to see the earliest instantaneous light through very clear air, in order to find if it was perceptibly blue. On 27th August, at 5 a.m., his wish was gratified. He was at Aix-les-Bains, and "beams of sunlight and shadows of distant mountains converged clearly to a point deep under the very summit of Mont Blanc. In the course of five or ten minutes I was able to watch the point of convergence travelling obliquely upwards till in an instant I saw a blue light against the sky in the southern profile of Mont Blanc, which in less than one-twentieth of a second became dazzlingly white, like a brilliant electric arc-light."

Etna in Eruption.—*Nature* gives the following account of a recent eruption of Mount Etna, particulars of which were supplied by Professor Ricco:—"On 19th July, at 8 a.m., Mount Etna threw out from its central crater an enormous mass of vapour, stones, lapilli, and cinders, which were lifted to a height of several kilometres, and afterwards covered all the south-east slope of the volcano, where the roads were covered by nearly a centimetre of volcanic ash. A number of stones struck the Etna Observatory (which is about a kilometre from the central orifice), so that about thirty holes were made in the iron plates, six millimetres in thickness, which cover this dome.....The steam of the eruption, condensing in the air, gave place to a warm and acid rain in the higher parts of the volcano, and lower down it caused ordinary rain.

"The column of steam had by 9 a.m. spread itself enormously in the sky, nearly over Catania (a distance of thirty kilometres), and caused a marked darkening. By 9.30 the column had disappeared.

"The eruption was accompanied by no perceptible movement of the earth, except a slight shock at the lower end of the Valle del Bove. The instruments at Catania only indicated a slight oscillation. At the Etna Observatory two seismometers showed horizontal and vertical movements. The eruption was also accompanied by detonations, which were heard very slightly as far as Catania."

Meteorology of the Isthmus of Panama.—The United States *Monthly Weather Review* for March gives some interesting details as to the meteorology of the Isthmus of Panama. The mean of the absolute maximum temperature at Colon varies from 89°·6 in February to 91°·9 in October, and the absolute minima from 68°·4 in January and April to 70°·5 in October. At Gamboa the absolute mean maximum was 97°·5 in June, and the minimum 59°·4 in February. The rainy season begins in May. On account of the northward advance of the rising air a diminution takes place in July in the interior, subject to a delay of one month on the Pacific side and two months on the Atlantic side. A second maximum occurs at the end of September in the interior, but at the end of October on the Pacific coast, and in the middle of November on the Atlantic coast. To this succeeds the dry season, which occurs in the months of January, February, March, and April all over the island. The mean annual rainfall on the Atlantic coast is 120 inches, which falls to 93 inches in the interior, and 62 inches on the Pacific coast. This large rainfall is in conformity with the rainfall of the United States regions in the neighbourhood of the Gulf of Mexico.

Earthquake Motion.—Japan is the paradise of the earthquake observer, and Professor Omori of Tokio is never at a loss for exercise in his seismological studies. He gives in a recent publication some valuable facts as to earthquake motions. The duration of an earthquake is directly as the magnitude of the disturbed area, and inversely as the distance of the observing station from the origin. The duration of the vertical component averages four-fifths that of the horizontal component. The period of the maximum movement, both horizontal and vertical, varies from ·53 to 1·7 seconds for slow undulations, and from ·12 to ·15 seconds for ripples. The average period of the horizontal slow undulations is approximately constant in the principal and end portions of an earthquake, while that of the ripples is slightly greater during the principal portion than during the preliminary portion and end tremors. It is worthy of note that the period of ripples never varies much from one-tenth of a second. In two of the twenty-five earthquakes upon which these conclusions are based, the angle of emergence, as well as the epicentre, was traced, and the focal depth was ascertained to be 15 and 9 kilometres respectively.

DIFFERENTIAL AND INTEGRAL CALCULUS FOR BEGINNERS.

THE student who has carefully followed the articles which have already appeared under the above heading in the pages of THE PRACTICAL TEACHER will have mastered the meaning of a differential coefficient, and acquired some experience in differentiating a number of functions which occur most frequently in physical investigations. An important application of the differential calculus will now be dealt with.

MAXIMA AND MINIMA. Remembering the definition which has already been given of a function, it will readily be seen

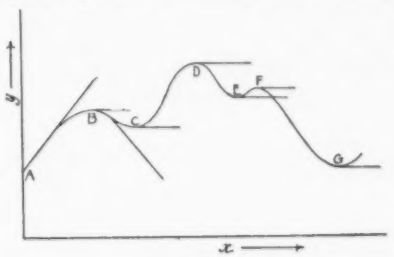

FIG. 1.

that the curve ABCDEFG (Fig. 1) might be represented by the equation

$$y = F(x).$$

The above curve is characterised by the occurrence of certain points B, D, F, which possess ordinates greater than points in the immediate vicinity. For instance, proceeding along the curve from A, it is obvious that the magnitude of the y ordinate increases until the point B is reached, and immediately afterwards commences to decrease. The points B, D, F of the curve are said to be maximum points, or at these points y is said to possess maximum values.

The term *maximum* must therefore be understood, not in the absolute sense (in which D alone would possess a maximum value), but as referring to a small part only of the curve. The essential for a maximum point is, that the value of y increases up to the point in question, and then decreases.

Consequently, a curve may possess any number of maximum points; some curves, such as those representing sine and cosine functions, possess an infinite number of maximum points.

For similar reasons, the points C, E, G are termed *minimum* points. In approaching one of these points the value of y diminishes, whilst after passing through that point the value of y increases.

If the curve ABCDEFG is represented by the equation

$$y = F(x),$$

then $\frac{dy}{dx}$ will represent the trigonometrical tangent of the angle which the geometrical tangent to the curve at the point (x, y) makes with the axis of x.

It can easily be seen that the value of $\frac{dy}{dx}$ will vary from point to point on the curve. The important point to notice is, *that at maximum and minimum points the tangent is parallel to the x axis;* in other words, at these points

$$\frac{dy}{dx} = 0.$$

This gives us a ready means of determining the co-ordinates of

points possessing maximum or minimum values. We simply express y in terms of x, obtain the value of $\frac{dy}{dx}$, and equate this to zero. We thus obtain an equation in x, which, when solved, gives us the abscissæ of the various maximum and minimum points of the curve.

The mathematical method of determining whether a particular value of x corresponds to a maximum or to a minimum point on the curve will be discussed subsequently. In a great many problems it is quite easy, from general reasoning, or from the nature of the problem, to discriminate between these two cases.

A few simple problems will now be discussed.

Problem.—A circle of radius r is drawn, and it is required to draw two radii in such positions that the area of the triangle formed by the radii and a straight line joining their points of intersection with the circumference of the circle shall possess a maximum value.

Let ABD (Fig 2) be the circle, and AC, BC any two radii. It

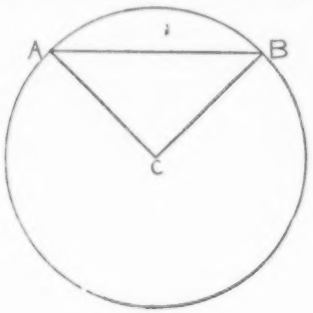

Fig. 2.

is required to draw AC, BC in such relative positions that the area ABC shall have a maximum value.

If two radii are drawn in a straight line, thus constituting a diameter of the circle (the angle ACB then being equal to 180°), the area of the triangle will possess a zero value.

If the angle between the two radii is diminished in successive stages, the area of the triangle will at first increase. When, however, the angle ACB = 0°, the area of the triangle will once more possess zero value. Hence whilst increasing the angle ACB, from 0° to 180°, the area of the triangle at first increases, reaches a maximum value, and then diminishes.

It is required to find the value of the angle ACB, for which the triangle possesses a maximum value.

Let angle ACB = x.

Area of triangle ACB = y.

Then, since the area of a triangle is equal to half the product of the adjacent sides into the sine of the included angle, we have

$$\text{Area of triangle ACB} = y = \tfrac{1}{2}r^2 \sin x.$$

When y has a maximum value, $\frac{dy}{dx}$ will be equal to zero.

$$y = \tfrac{1}{2}r^2 \sin x.$$

$$\frac{dy}{dx} = \tfrac{1}{2}r^2 \cos x = 0, \text{ for maximum value of } y.$$

$$\therefore \cos x = 0.$$

$$\therefore x = \frac{\pi}{2}.$$

Therefore the radii must be drawn at right angles to each other.

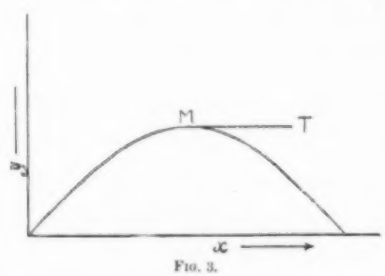

Fig. 3.

Fig. 3 roughly represents the manner in which the area of the triangle varies as the angle ACB is increased from 0 to π. The point M is the required maximum point, and here the tangent MT is horizontal, and $\frac{dy}{dx} = 0$.

Problem.—It is required to cut the largest possible rectangular strip from a circular piece of paper.

Let ABCD (Fig. 4) be a rectangle enclosed in a circle. It is

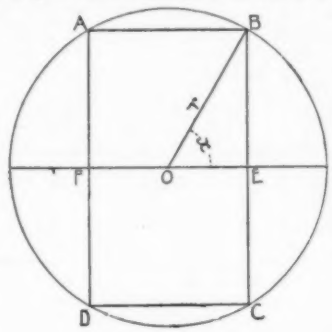

Fig. 4.

required that the sides AB, BC shall be so proportioned that the area ABCD shall be a maximum.

Let O be the centre of the circle, and let OB, the radius of the circle, be represented by r.

Draw OE perpendicular to the line BC.

Let the angle BOE = x.

Area of rectangle = y.

Then BC = 2BE = $2r \sin x$.

Also, AB = FE = 2OE = $2r \cos x$.

$\therefore$ Area of rectangle ABCD = y = AB × BC = $4r^2 \sin x \cos x$.

Remembering that $2 \sin x \cos x = \sin 2x$, we have—

$$y = 2r^2 \sin 2x.$$

$$\therefore \frac{dy}{dx} = 2r^2 \cos 2x.$$

For y to be a maximum, $\frac{dy}{dx} = 0$.

$$\therefore \cos 2x = 0,$$

$$2x = \frac{\pi}{2},$$

$$x = \frac{\pi}{4} = 45°.$$

Therefore,

$$\text{BC} = 2r \sin 45° = 2r \times \frac{1}{\sqrt{2}}$$

$$\text{AB} = 2r \cos 45° = 2r \times \frac{1}{\sqrt{2}} = \text{BC}.$$

Therefore the largest rectangle which can be cut from a circular piece of paper is a square, of which the four corners lie on the circumference of the circle.

Problem.—It is required to draw the ellipse which, with a given perimeter, shall possess a maximum area.

Given that (a) perimeter of ellipse = $\pi (x + z)$, where x and z are the principal semi-axes of the ellipse, and *(b) area of ellipse* = πxz.

It can easily be seen that an ellipse possessing semi-axes, of which one is very long and the other correspondingly short, will possess an extremely small area.

If such an ellipse is taken, and the longer axis is diminished by successive small stages, then the area will increase. At a certain stage a circle will be formed, the two semi-axes then being equal. A further diminution of the same axis will produce an ellipse with its major axis at right angles to the major axis of the original ellipse. Hence, the area will finally diminish, and the maximum value of the area will occur when the area ceases to increase, and is just about to diminish.

Let p = the given perimeter of the ellipse. Then, since p is to possess an invariable value,

$$p = \pi (x + z).$$

$$\therefore z = \frac{p}{\pi} - x.$$

Let y = area of ellipse.

Then

$$y = \pi xz = \pi x\left(\frac{p}{\pi} - x\right)$$

$$= px - \pi x^2$$

$$\frac{dy}{dx} = p - 2\pi x.$$

For y to be a maximum,

$$\frac{dy}{dx} = p - 2\pi x = 0.$$

$$\therefore x = \frac{p}{2\pi}.$$

To find z, we have

$$z = \frac{p}{\pi} - x = \frac{p}{\pi} - \frac{p}{2\pi} = \frac{p}{2\pi},$$

that is, the two principal axes of the ellipse are equal, and the particular ellipse is therefore a circle.

The above property of an ellipse, of possessing, when the semi-axes are equal, a maximum area for a given perimeter, has been utilised by Professor Boys in designing leaden water-pipes which will not burst during frosty weather. The pipes are made of elliptical sections, and the expansion of the water on freezing simply tends to make the section more circular, since this will produce a greater sectional area, and therefore a greater volume for a given length of pipe. Such pipes were frozen many times in succession without a rupture occurring, whilst pipes of circular section were invariably burst at the second or third freezing. That Professor Boys's pipes have not been more extensively used is probably due to a charitable feeling toward the poor plumber, who would certainly, on their adoption, lose most of his interest in hard winters.

NOTES ON THEORETICAL MECHANICS.

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ADVANCED AND HONOURS STAGES.

It will at once be evident, to those familiar with the syllabus of theoretical mechanics, that in the comparatively short space available in these notes it is impossible to deal effectively with all the difficulties which are likely to be met with; hence it will be desirable to merely suggest or give hints for the simpler questions, thus allowing the difficult parts of the subject to be more fully dealt with. The Editor will be glad to receive any suggestions or queries from our readers which may tend to make these hints and notes more generally useful.

In The Practical Teacher, p. 548, March 1899, definitions and important formulæ are to be found; it will only be necessary very briefly to recapitulate them here.

Thus a *solid has both size and shape*, a *liquid has size but not shape*, and a *gas has neither shape nor size*. By suitable changes of temperature and pressure, a substance may be made to pass from one state to another. The simplest illustration of the change from a solid to a gaseous state is furnished by a lump of ice. On the application of heat the ice is converted into water, and by a further application into steam. The converse operation occurs with gases, such as air, oxygen, etc.: by increasing the pressure and lowering the temperature, these may be converted into solids.

Liquids, although not absolutely incompressible, are very nearly so. Thus with water the fractional change of volume due to a change of pressure of 1 atmosphere (14·7 lbs.) is about $\frac{1}{20000}$. Hence it follows that if a given mass of liquid be placed in a vessel, it will not only assume the shape of the vessel, but will occupy a portion of the vessel equal to its own volume. The surface of the liquid not in contact with the sides of the vessel is called the *free surface*.

Gases are compressible fluids, and, given sufficient data, the alteration in pressure due to compression or expansion can be calculated or experimentally determined. The expansibility of a gas is shown by a small volume of gas entirely filling any closed vessel in which it may be placed; hence a *gas has no free surface*.

The pressure exerted by a liquid on any small area with which it is in contact is assumed to be perpendicular to that area; the slight deviation is due to the viscosity of the liquid. The *pressure* is often referred to as the *thrust* of the liquid, the word "pressure" *denoting the intensity of the thrust per unit area.*

The *total (or whole) pressure* on any surface is *the sum of the pressures on all the elements of the surface, and is equal to the product of the area of the surface, multiplied by the depth of its centre of gravity and by the weight of unit volume of the liquid*, or $P = wA\bar{z}$, where P denotes the total pressure on an area A, and $\bar{z}$ the depth of its centre of gravity. This may be proved as follows:—

Let a denote a small element of the area at a distance z from the surface; imagine a small prism of liquid, area of base a and height z; its weight will be waz. A similar result would be obtained for any other element, and the sum of all such elements would in the usual way be denoted by $\Sigma(az)$—Σ indicating the "sum of." But $A = \Sigma(a)$.

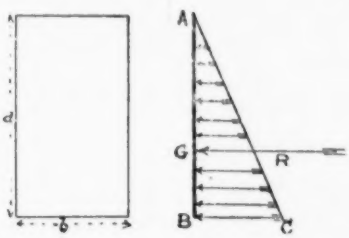
Hence $$\bar{z} = \frac{\Sigma(az)}{\Sigma(a)}.$$

$$\therefore \Sigma(az) = \Sigma(a)\,\bar{z} = A\bar{z}, \text{ or } P = wA\bar{z} \quad . \quad . \quad . \quad . \quad . \quad (1).$$

Also, as $w\bar{z}$ is the pressure at the centre of gravity, the *total pressure is the product of the area of the surface and the pressure at the centre of gravity of the surface.*

Taking the atmospheric pressure into consideration, the total pressure is given by $P = wA\bar{z} + AP_o$ (2), where P_o denotes the atmospheric pressure.

The resultant pressure is the resultant of the pressures on all the elements of the surface. In a plane surface the forces form a system of like parallel forces, the resultant being the sum of the forces; hence the resultant pressure and the total pressure are the same. This is not the case with a curved surface—the pressures on the elements of the surface forming a series of forces acting in different directions, and the resultant is *not* the sum of the forces. Thus the *magnitude* of the resultant can be found: its *direction* is perpendicular to the surface, and its *position* or *point of application* is called the *centre of pressure*; or, in other words, the centre of pressure of a plane area is the point at which the thrust of the liquid may be supposed to act as a single concentrated force. In the simpler cases the centre of pressure is readily obtained, in others it presents more difficulty. As an example of the simplest case, consider a vertical rectangle, breadth b, depth d, its upper edge in the surface of the liquid. Let AB represent one edge of the rectangle. The pressure, which is zero at the upper edge, increases uniformly with the depth. If BC to any convenient scale denotes the pressure at B,



then, joining C to A, the pressure at any point can be obtained by drawing a line through the point parallel to the base BC. The resultant, R, is the sum of all such forces, and passes through the centre of gravity of the triangle; hence the distance AG $= \frac{2}{3}$ AB.

In a similar manner the centre of pressure may be obtained when the upper edge of the rectangle, instead of being in the surface of the liquid, is at some given distance below it. Some typical cases, worked out fully, will be found in The Practical Teacher, p. 657, May 1899.

A few simple examples are given before proceeding to more general formulæ:—

Ex. 1. A hollow hemisphere is full of water: find the ratio between the total pressure on the surface of the hemisphere and the weight of the water.

Let r denote the radius.

Then the surface $= 2\pi r^2$; also the depth of the centre of gravity $= \frac{r}{2}$.

$$\therefore \text{Total pressure} = w \times 2\pi r^2 \times \frac{r}{2} = \pi r^3 w.$$

$$\text{Volume of water} = \frac{2}{3}\pi r^3; \text{ weight} = \frac{2}{3}\pi r^3 w.$$

$$\therefore \frac{\text{Total pressure}}{\text{Weight of water}} = \frac{\pi r^3 w}{\frac{2}{3}\pi r^3 w} = \frac{3}{2}.$$

Ex. 2. Find the difference of pressure on the two sides of a vertical lock-gate, 10 feet broad, against which the water rises to a height of 12 feet on one side and 4 feet on the other.

Area of wetted surface on one side $= 10 \times 12$ sq. ft.

Depth of centre of gravity $= 6$ feet.

$\therefore$ Pressure on that side $= 10 \times 12 \times 6 \times 62\frac{1}{2}$ lbs.

Area of the other side $= 10 \times 4$ sq. ft.

Pressure $= 10 \times 4 \times 2 \times 62\frac{1}{2}$ lbs.

$\therefore$ Difference of pressures $= 10 \times 62\frac{1}{2}(12 \times 6 - 4 \times 2)$ lbs. $= 625 \times 64$ lbs. $= 40{,}000$ lbs.

Ex. 3. Show that the total pressure on the surface of a hollow sphere filled with liquid is three times the weight of the liquid.

Ex. 4. ABCD is a rectangle, having AB = 2 feet in surface, and BC vertical = 6 feet: find the centre of pressure of the part below the horizontal line through the centre of gravity of the rectangle. Ans. $4\frac{2}{3}$ ft. from AB.

Ex. 5. Show that the centre of pressure of a rectangle, having its plane vertical, its upper edge horizontal and below surface at a distance equal to the height of rectangle, is at a point $\frac{5}{9}h$, where h denotes the height of rectangle.

Ex. 6. State and prove a rule for finding the whole pressure of a liquid on a body immersed in it.

A sphere, radius 2 feet, has its centre 3 feet below the surface of water: find the whole pressure of the water on it; find also the resultant pressure of the water on it.

Ans. 3000π lbs.; $\frac{2000\pi}{3}$ lbs.

QUERY COLUMN.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

WILL reader who sent query on Magnetism recently, kindly repeat same? Reply will then be sent direct by post.

Tim.—If $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=\frac{1}{a+b+c}$, prove that $\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)^{2n+1} = \frac{1}{a^{2n+1}+b^{2n+1}+c^{2n+1}}$. (Todhunter's *Larger Algebra.*)

We are given that a, b, and c are quantities such that

$$\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=\frac{1}{a+b+c}.$$

On inspection, this does not hold for *any* values of a, b, and c. Hence we proceed to find in what way the three quantities are related to each other.

$$\frac{bc+ac+ab}{abc}=\frac{1}{a+b+c}.$$

$$(bc+ac+ab)(a+b+c)=abc.$$

$$abc+a^2c+a^2b+b^2c+abc+ab^2+bc^2+ac^2+abc=abc.$$

$$a^2c+a^2b+b^2c+ab^2+bc^2+ac^2+2abc=0.$$

$$c(a^2+b^2+2bc)+ab(a+b)+c^2(a+b)=0.$$

$$c(a+b)^2+ab(a+b)+c^2(a+b)=0.$$

$$(a+b)(ca+cb+ab+c^2)=0.$$

$$(a+b)(b+c)(c+a)=0.$$

This will hold if $a=-b$, or if $b=-c$, or if $c=-a$. Noticing that $2n+1$ is *an odd number*, whatever n may be, and supposing $a=-b$, we find that

$$\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)^{2n+1}=\left(\frac{1}{-b}+\frac{1}{b}+\frac{1}{c}\right)^{2n+1}=\left(\frac{1}{c}\right)^{2n+1}=\frac{1}{c^{2n+1}}.$$

Also,

$$\frac{1}{a^{2n+1}+b^{2n+1}+c^{2n+1}}=\frac{1}{(-b)^{2n+1}+b^{2n+1}+c^{2n+1}}$$

$$=\frac{1}{-(b^{2n+1})+b^{2n+1}+c^{2n+1}}=\frac{1}{c^{2n+1}}.$$

M.F.—For doing a certain work, A's ability is equal to the joint ability of B and C. If A and B together could do it in 9 hours 36 minutes, and C by himself in 48 hours, in what time could B alone do it?

In 1 hour C can do $\frac{1}{48}$ of the total work.

In 1 hour A and B together can do $\frac{1}{9\frac{2}{5}}=\frac{5}{48}$ of total work.

$\therefore$ In 1 hour A, B, and C together can do $\frac{1}{8}+\frac{5}{48}=\frac{1}{8}$ of total work. But A's ability is equal to the joint ability of B and C; therefore in 1 hour A can do $\frac{1}{2}$ of $\frac{1}{8}=\frac{1}{16}$ of total work; and since A and B together can do $\frac{5}{48}$ of work in 1 hour, B can do $\frac{5}{48}-\frac{1}{16}=\frac{1}{24}$ of work in 1 hour, and therefore the total work by himself in 24 hours. Ans.

W. Duchatt.—A passenger train 120 yards long passes a goods train on an incline, which every second increases the rate of the passenger and diminishes the rate of the goods train by $2\frac{1}{2}$ yards in 10 seconds. They pass in $7\frac{1}{2}$ seconds. When they begin to pass they are moving, respectively, at the rates of 45 miles and 30 miles an hour. Find the length of the goods train, and its rate when the two trains have passed each other.

Since the incline diminishes the speed of the goods train by the same amount and at the same rate as it increases the speed of the passenger train, the trains will take exactly the same time to pass each other as if they met on the level, at 45 and 30 miles an hour respectively. Hence imagine them to pass on the level.

The relative speed of one train with respect to the other is $45+30=75$ miles an hour. That is, the trains would take the same time to pass each other if the goods train were still and the passenger train travelled at 75 miles an hour.

Hence the passenger train going at 75 miles an hour travels a distance equal to the *sum of the lengths* of the two trains in $7\frac{1}{2}$ seconds.

Now in $7\frac{1}{2}$ seconds the passenger train going at 75 miles an hour travels $\frac{75}{60\times60}\times7\frac{1}{2}$ miles $=\frac{75\times15\times1760}{2\times60\times60}$ yards $=275$ yards. The length of the goods train is therefore $275-120=155$ yards. Ans.

The speed of the goods train is diminished *every second* by an amount $2\frac{1}{2}$ yards per 10 seconds—that is, by an amount $\frac{9}{20}$ miles per hour.

In $7\frac{1}{2}$ seconds its speed will be $30-\left(\frac{9}{20}\times7\frac{1}{2}\right)$ miles an hour.

$$=30-3\tfrac{3}{8}=26\tfrac{5}{8}\text{ miles an hour.}$$

Ralpho.—(1.) If $x=a^2-bc$, $y=b^2-ca$, $z=c^2-ab$, prove that $abc(ax+by+cz)^3=(x^2-yz)(y^2-zx)(z^2-xy)$.

(2.) If $\frac{a-b}{1+ab}+\frac{c-a}{1+ca}+\frac{b-c}{1+bc}=0$, then two of the quantities a, b, c are equals. (M.A., St. Andrews, 1893.)

(1.) Substituting the values given of x, y, and z, we get—

$$\begin{aligned}ax+by+cz&=a(a^2-bc)+b(b^2-ca)+c(c^2-ab)\\&=a^3-abc+b^3-abc+c^3-abc\\&=a^3+b^3+c^3-3abc.\end{aligned}$$

$$\begin{aligned}x^2-yz&=(a^2-bc)^2-(b^2-ca)(c^2-ab)\\&=a^4-2a^2bc+b^2c^2-b^2c^2-a^2bc+ac^3+ab^3\\&=a^4+ac^3+ab^3-3a^2bc\\&=a(a^3+b^3+c^3-3abc).\end{aligned}$$

Similarly,

$$y^2-zx=b(a^3+b^3+c^3-3abc), \text{ and}$$
$$z^2-xy=c(a^3+b^3+c^3-abc).$$

Hence

$$\begin{aligned}abc(ax+by+cz)^3&=abc(a^3+b^3+c^3-3abc)^3\\&=(x^2-yz)(y^2-zx)(z^2-xy).\end{aligned}$$

(2.) $$\frac{a-b}{1+ab}+\frac{c-a}{1+ca}+\frac{b-c}{1+bc}=0.$$

$$(a-b)(1+ca)(1+bc)+(c-a)(1+ab)(1+bc)+(b-c)(1+ab)(1+ca)=0.$$

Multiplying out, and cancelling, we find that this reduces to—

$$ab^2-a^2b+bc^2-b^2c+ca^2-c^2a=0.$$

$$c^2(b-a)+ab(b-a)-c(b^2-a^2)=0.$$

$$(b-a)[c^2+ab-bc-ca]=0.$$

$$(b-a)[c(c-b)-a(c-b)]=0.$$

$$(b-a)(c-b)(c-a)=0.$$

This is true if $b=a$, or if $c=b$, or if $c=a$.

OUR FRENCH AND GERMAN PRIZE COMPETITION.

Prize Editor—W. T. THOMPSON, B.A. (LOND.), *French and German Honours.*

FRENCH PRIZE COMPETITION.

A Prize of One Guinea will be given for the best translation into English of the following extract:—

Je veux m'assurer par moi-même de l'existence d'un sculpteur qui signe des mêmes initiales que toi. Je t'ai déjà dit que ton sosie en sculpture était mon ami; ce soir, j'en réponds, vous serez au mieux ensemble. C'est un garçon naïf, aimant la nature et la traduisant avec vérité; il pouvait aussi faire de grands bonshommes devant lesquels la foule indifférente passe sans s'arrêter; il a préféré attacher son nom à de petits chefs-d'œuvre que lui seul n'estime pas assez, mais qui attirent et charment les vrais connoisseurs, parce qu'ils reconnaissent le profond sentiment de l'art et l'originalité du talent. J'entends, dit amèrement Maurice; ton éloge de Mario est un blâme indirect à mon adresse.—Tu prononceras toi-même tout à l'heure, car il est temps de partir pour l'hôtel des ventes, si nous voulons être là au premier coup de marteau d'ivoire du commissaire-priseur. Aurèle prit le bras de Maurice, et tous deux gagnèrent la rue Drouot. Un grand nombre de voitures stationnaient devant l'hôtel. Des femmes élégantes, des hommes du monde, des artistes illustres, causaient avec animation en montant le large escalier du premier étage pour se rendre à la salle numéro 2. La physionomie des marchands qui s'y étaient donné rendez-vous n'était pas celle des brocanteurs habituels. Ceux qu'on appelle les gros bonnets de la curiosité faisaient seuls acte de présence. On s'entassait dans la salle: les places réservées étaient prises d'assaut; pour y arriver, il fallait escalader les banquettes, ce que firent à grand'peine le peintre d'oiseaux et l'auteur encore inconnu du Vercingétorix ignoré. F. A. GUERBER.

GERMAN PRIZE COMPETITION.

A Prize of Half a Guinea will be given for the best translation into English of the following extract:—

Ueber den Dachfirsten der Hauptstadt qualmte ein düstrer Novembernebel, der seine Schleier von Minute zu Minute tiefer senkte, und so das Hereinbrechen der Nacht in fast unheimlicher Weise beschleunigte. Das röthliche Licht der Gaslaternen glomm trüb und traurig durch die graue, dunstige Hülle; selbst der rastlose Lärm der Strassen schien abgedämpfter an das Ohr zu schlagen. Die breiten Steinplatten der Trottoire hatten sich mit jener dunklen, tropfenlosen Nässe bedeckt, die den unwirthlichen Eindruck des Nebelwetters noch zu erhöhen und die Sehnsucht nach einem traulichen Sitz am Kamine zu verdoppeln pflegt. Die Menschenmenge, die von den glänzend erleuchteten Etalagen der prächtigen Magazine hin und her wogte, fand heute keine Zeit, die ausgestellten Kostbarkeiten zu bewundern. Jedermann schien seine Schritte nach Kräften zu beschleunigen und lediglich die möglichst schnelle Erreichung seines Zieles vor Augen zu haben. Kurz, es war herzlich ungemüthlich in den Strassen, urd wer nicht dringende Geschäfte zu erledigen hatte, der blieb hinter der Befestigungslinie seines Daheim und freute sich seiner behaglich flackernden Eichenblöcke. E. ECKSTEIN.

RESULT OF THE SEPTEMBER COMPETITION.

French.

The prize is awarded to "Atlantis," the pseudonym of Miss M. Forrester, Greenlands, Garstang, Lancashire.

First Class.—Reuben Butler, Abracadabra, Chemineau, Lucille, Robinson Crusoe, Esrum, Polly, Ashdown, C.E.M., Consuelo, Dr. Dee, Hamoaze, Bourdaloue, Imprimatum, Trilby (Edinburgh), Le Sud, Thistle, Echo, Mentone, Rockwell, Marzavan, Agaznog, Mary Anne, Misogynist, Isobel, Dei donum, Janet, Leo, Primum, Kettering, Saxifrage, Dies, M.E.R., Rustica, Espoir, Iona, Tomtom, Braxet, Carpe diem, Chrysostom, Labor omnia vincit, M., Trilby (Durham), Fertilis, Nortoniensis, Sea, Anastasia, Automobile, Ivan, Meteorite, Ierne, Nemo, S' Rioghal Mo Dhream, Sorbonne, Migge, Cawdor, Dum spiro spero, Forward, Louisiana, Eureka, Cygnet, Baldur, L'espérance, Lesbia, Violet, Nellie, Wilder, Pawney, La Novice, Etoile, Olivie.

Second Class.—Laura, Homeless, Annie Laurie, Springwood, Hogg, Hyacinthe, Excelsior, Mount Grace, Novice, Integer, Iris, Olyen, Hurly-burly, Student, Kate Carnegie, Connemara, Mein Liebchen, Des Roches, Monmouth, Cynthia, Maria Antonia, Kingston, Rutherford, Diana of Poictiers, Smoke, Shepherd, Florence, Arnaud, Poll, Miriam, Ça y est, Tess, Langton, Juvenile, Marden, Kythé, Plato, Nigger, Segah, Sambo, Fidus Achates, Mains, Melson.

German.

The prize is awarded to "Consuelo," the pseudonym of Miss Kathleen H. B. Kirby, Braehead, Leslie, Fife.

First Class.—Atlantis, C.E.M., Red Main, Hamoaze, Oxon, Ivan, Dies, Thrums, Monmouth, Echo, M.E.R., Integer, Nellie, Trilby (Edinburgh), Maria Antonia, Lebensmüde, Mariechen, Shepherd, Den Erlkönig, Ierne, Agaznog.

Second Class.—Tomtom, Baldur, Cawdor, Mein Liebchen, Florence.

In both competitions there was a larger proportion of good papers than usual. Briefly noting the chief stumbling-blocks in the extracts set, I found that a great many competitors were not acquainted with the idiomatic use of *toujours* in *Sacrifie toujours!* Next to this in difficulty ranked *On avait beau ne pas adorer les étoiles*, which has a concessive force when taken with the next sentence. Some failed to see the special meaning of *considérait*, and others joined *dans un péril* to *devenait une divinité* instead of to *trouré par hasard*, to which it refers, both by its position and by its sense. In the German, the different uses of *an* with the dative and accusative (*an der Niederelbe* and *an die Grenze*) led some into difficulties. The use of *jagen* with *sein*, and the distinction between *Grab* and *Graben* were also not known to several who sent in translations.

French Prize Translation.

His mind was disturbed by a religious scruple. By worshipping Aptouknos, the Libyan god, he was afraid of offending Moloch; and he timidly asked Spendius to which of the two gods it would be advisable to offer a human sacrifice. "Sacrifice, that's all that is wanted!" said Spendius, laughing. Matho, to whom such indifference was incomprehensible, suspected the Greek of having a familiar spirit, which he did not wish to speak about. Every form of religion, as well as every nationality, was to be met with amid these barbarian armies, who reverenced also the gods of other nations—for they, too, were awe-inspiring—and many of whom practised also foreign rites along with their own peculiar religious ceremonies. It was all very well not to worship the stars—such and such a constellation being of good or evil import, sacrifices were offered to it. An amulet of unfamiliar device, discovered accidentally at a critical moment, was turned into a divinity; or maybe it was a name, merely a name, which was repeated without even the slightest effort being made to understand its meaning. At length, however, from having spoiled so many temples, seen such varieties of nations and great massacres, many ended in believing only in fate and death, and fell asleep every evening with the carelessness of wild beasts. Spendius would have thought nothing of spitting on the statue of the Olympian Jove; nevertheless he was afraid of speaking aloud in the darkness, and every day never failed to put on his right boot first.

"ATLANTIS."

German Prize Translation.

I am healthy and in good spirits, and, as adjutant to the major, made the most hazardous expedition with him that you can think of. A small company of us made a dash through the middle of the enemy, from Stendal on the Lower Elbe to here, the boundary of Bayreuth. Since the 29th of May I have not dismounted: I slept only on horseback, and took several prisoners with my own hand. In spite of this severe exertion I am strong and cheerful, and rejoice in the daring of this life. I have had striking experiences of the realisation of forebodings. Before the unfortunate affair at Kitzen, Major L. showed me in the distance a grave, of which there is a countless number since the battle of Lützen. I rode briskly up to it, and as I approached nearer, my horse sank into it with his fore-feet. This gave me a disagreeable feeling, and I came back to the major feeling a little upset. I said to him that I fancied things would yet that day go badly for us—we had already seen the French outposts in the distance—but he laughed at me, and begged me to leave poetry out of real life. Shortly afterwards, as I rode forward to parley, his horse stumbled (it was the best jumper in the whole corps) as it was crossing a little ditch. L. struggled with difficulty from under it, and for the second time I had the painful feeling of approaching misfortune. Five minutes afterwards, wounded by three strokes, I sank on the neck of my horse, and I owe my life to its spring, else would the fourth blow, which tore my cloak, have ended my existence. "CONSUELO."

THE EDITOR'S TABLE

ABBOT, JONES, AND CO., LIMITED.

Early Lessons in Composition for Standards III.–VII. A booklet containing many useful notes and hints on points to be observed by beginners in English composition. It is intended to be used in connection with oral lessons, and contains a large number of exercises suitable for practice.

AMERICAN BOOK COMPANY, NEW YORK.

The Student's Manual of Physics. For the Study-room and Laboratory. By Le Roy C. Cooley, Ph.D., Professor of Mathematics in Vassar College. The older method of giving to a class of students statistical information on any science subject was unsatisfactory to both teachers and students. It is now happily replaced by a better system, in which the student, instead of seeing an experiment performed by the practised hand of a teacher, is furnished with the necessary materials and apparatus, and makes the experiment himself. In this manner, instead of attempting to remember a law expressed in language which he cannot fully understand, he learns by his own experiments that such a law exists; he can trace it even in a rough experiment, but, with care and accuracy, is able to obtain a much better approximation. Having gone so far, there is an incentive to spur him on to understand what the law really means. Thus, instead of being a mere statement, it may become of vital interest and importance.

In this book of 448 pp., 130 of which are devoted to electricity, the chief laws of physics are explained in a clear, concise, and systematic manner. Experiments are very numerous. These are described in a simple and clear style, well within the reach of even a beginner, and, being well illustrated, they add to the value of the book very considerably. The latest discoveries in physics obtained by Hertz, Tesla, Röntgen, etc., are clearly set out. Although there is so much to praise, one or two defects must be noticed; thus, the spelling of the word centre as "center," and the term "nickel" for a coin, etc., may seem a little strange to English readers. The much-abused word *power* might be retained for *rate of doing work*, and not used, as in this and in other books, to denote a force or an effort. The words *centrifugal force*, when used, call for some little explanation, or a pitfall may be made for an unwary student. On p. 21, a ton is referred to as 2,000 lbs. It would also add to the value of the book if the answers to all the exercises were given. We confidently recommend the book. It is fully and clearly illustrated, attractively bound, and well printed.

Bible Readings for Schools. Edited by Nathan C. Schaeffer, Ph.D., D.D. Dr. Nathan, the Superintendent of Public Instruction of Pennsylvania, has provided in this volume an admirable selection of readings from the Bible. They begin with the creation, and include portions from the Psalms, the Proverbs, the Prophetical Books, from the parables and other teachings of Christ and the apostles. The aim is practical and ethical rather than dogmatic. An introduction on the educational value of the Bible consists of well-chosen extracts on the subject expressing the opinions of eminent writers. The selections from the Poetical Books are given in metrical form, and the whole is capitally printed.

A Brief Latin Grammar. By W. D. Mooney, A.M. The aim of this work is to present the essentials of Latin grammar with few rules concisely expressed and illustrated by a few carefully-chosen examples, instead of overloading its pages with the minutiæ of technical grammar and the multitude of exceptions which repel the beginner, and, so far as they are at all necessary, find more fitting place in books for advanced students. The author seems to have realized his object very effectively, and the result is a book marked by praiseworthy clearness.

Fragments of Roman Satire. Selected and arranged by Elmes T. Merrill. The editor has collected here the most noteworthy passages from the less known, or less accessible, Roman satirists, from Ennius to Apuleius. They are intended to assist literary rather than linguistic study, and accordingly no notes are given, beyond a sort of running commentary. The volume is well printed and neatly bound.

B. T. BATSFORD, 94 HIGH HOLBORN.

Linear Perspective. By G. A. T. Middleton. A reprint of two articles very pleasantly and clearly explaining and illustrating the principles of Perspective (direct) and the perspective of shadows and reflections. Students using the measurements method would do well to supplement their knowledge by reading this little book.

BLACKIE AND SON, LONDON.

A New Sequel to Euclid, Part I. By W. J. Dilworth, M.A. We have nothing but praise for this excellent little book, which should be in the hands of every teacher and every student of geometry.

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A Manual of Optics. By the late Professor Haughton. Revised by the Rev. J. Warren, M.A. This *réchauffé* of an erstwhile popular little manual has been well done by Mr. Warren, so that the late Professor Haughton's Optics may now be expected to enter upon a new lease of life.

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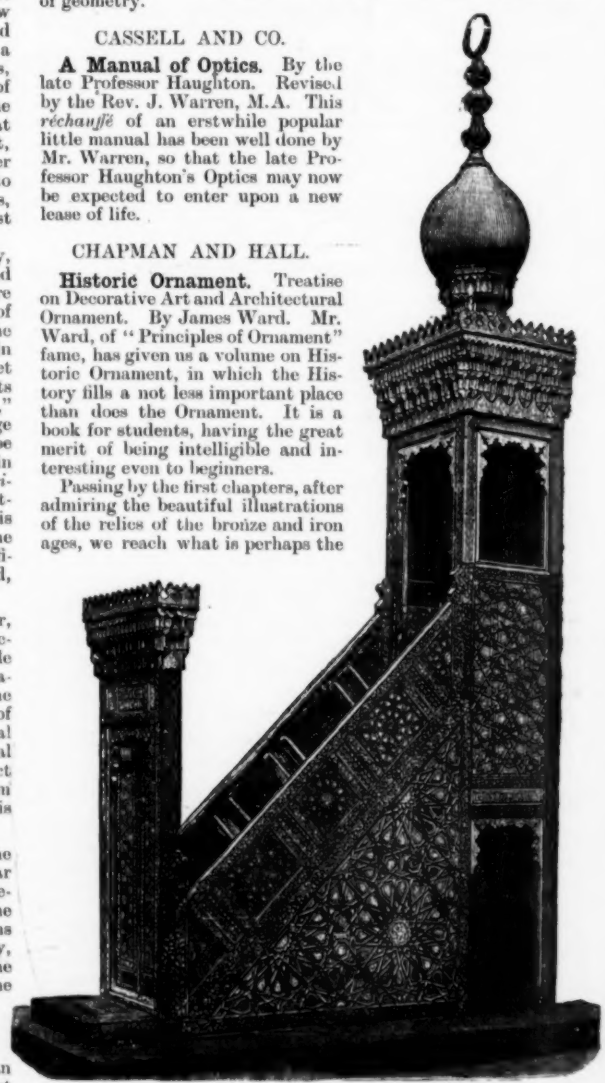

Fig. 354.—Pulpit of the Sultan Kâit Bey. Fifteenth Century.

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It is impossible, in the limited space at our disposal, to give the numerous objections urged against books on mechanics by the author, and, for the same reason, we can give only a few examples of the kind of information to be found in its pages. Thus, on page 20, "The gravitation between two bodies always acts as if it were exerted between two mathematical points." On page 91, "A machine is an apparatus for multiplying or dividing force. Of the nature of the process we know absolutely nothing. Mathematicians and scientists do not seem to have the courage to confess this in print, although they are well aware of their own ignorance." Again, on page 33, "The Atwood's machine consists of a wheel which can rotate but not locomote." In addition to locomote, we meet with trigonomics, moment terminology, etc.

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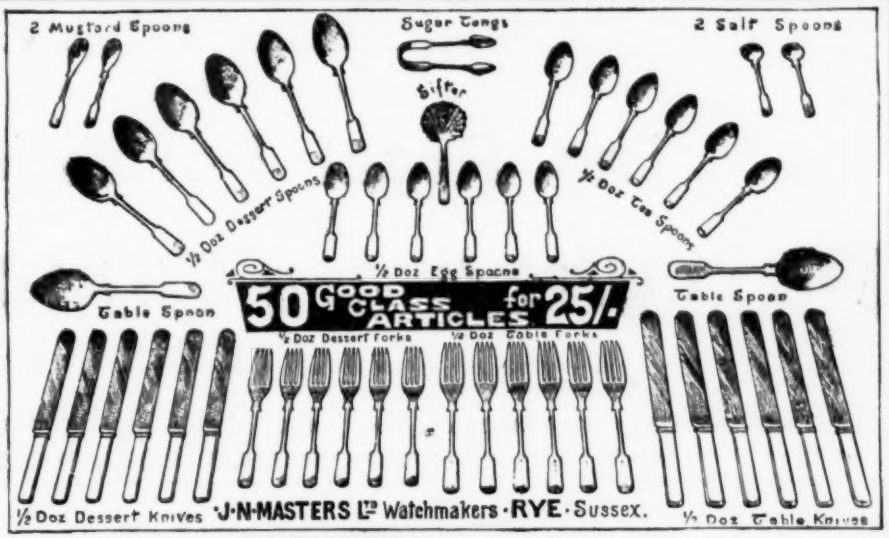

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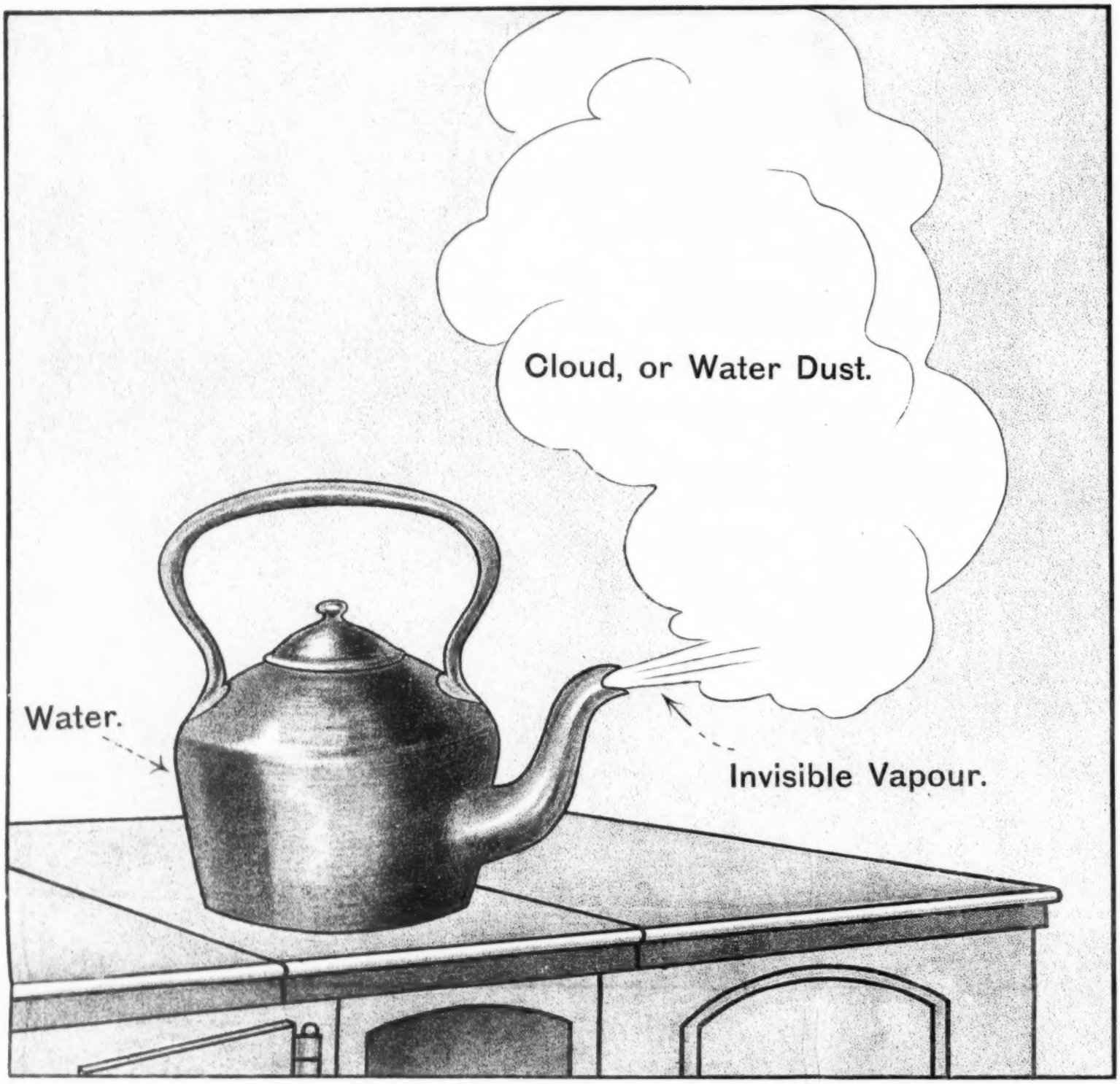

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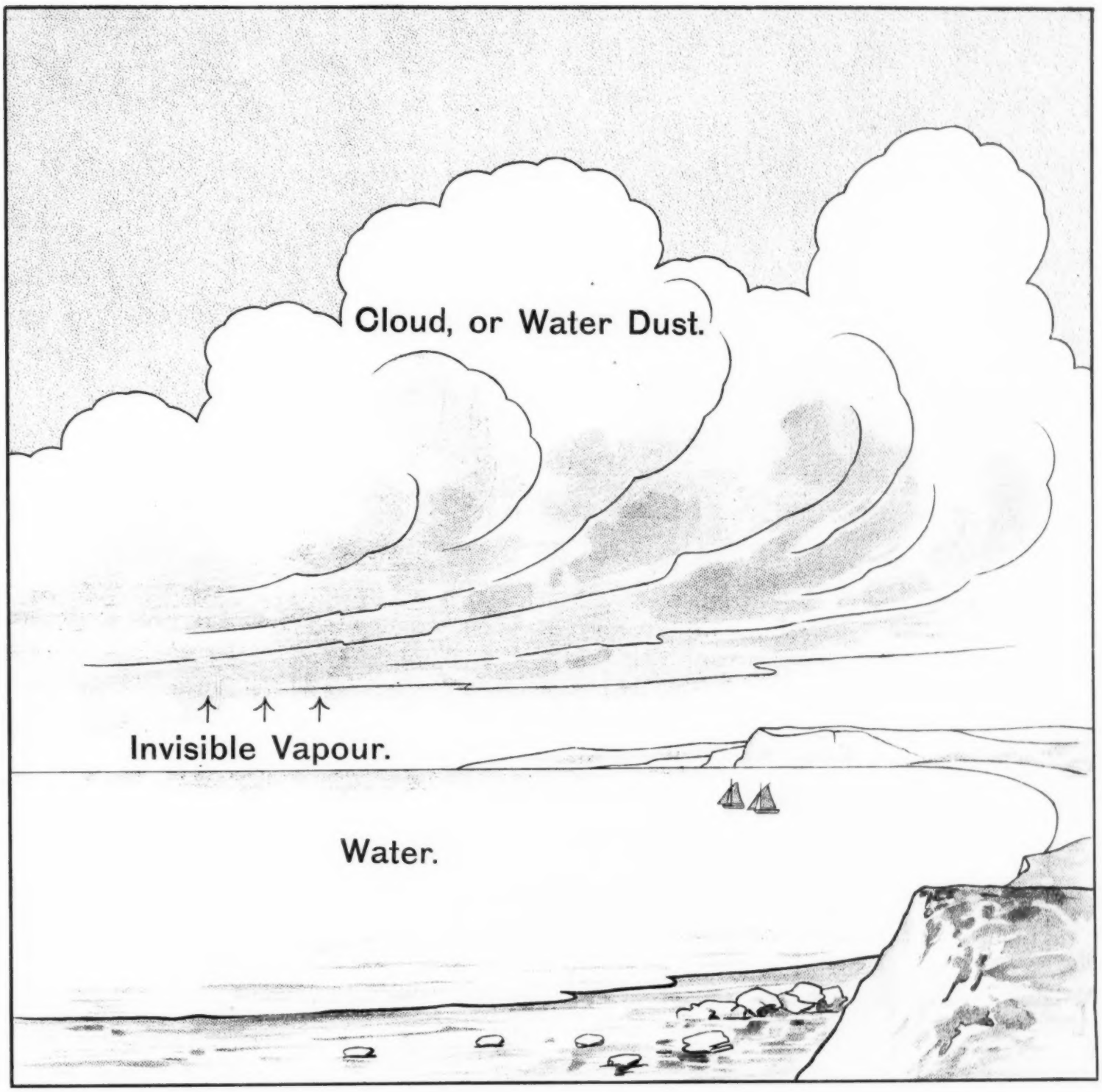

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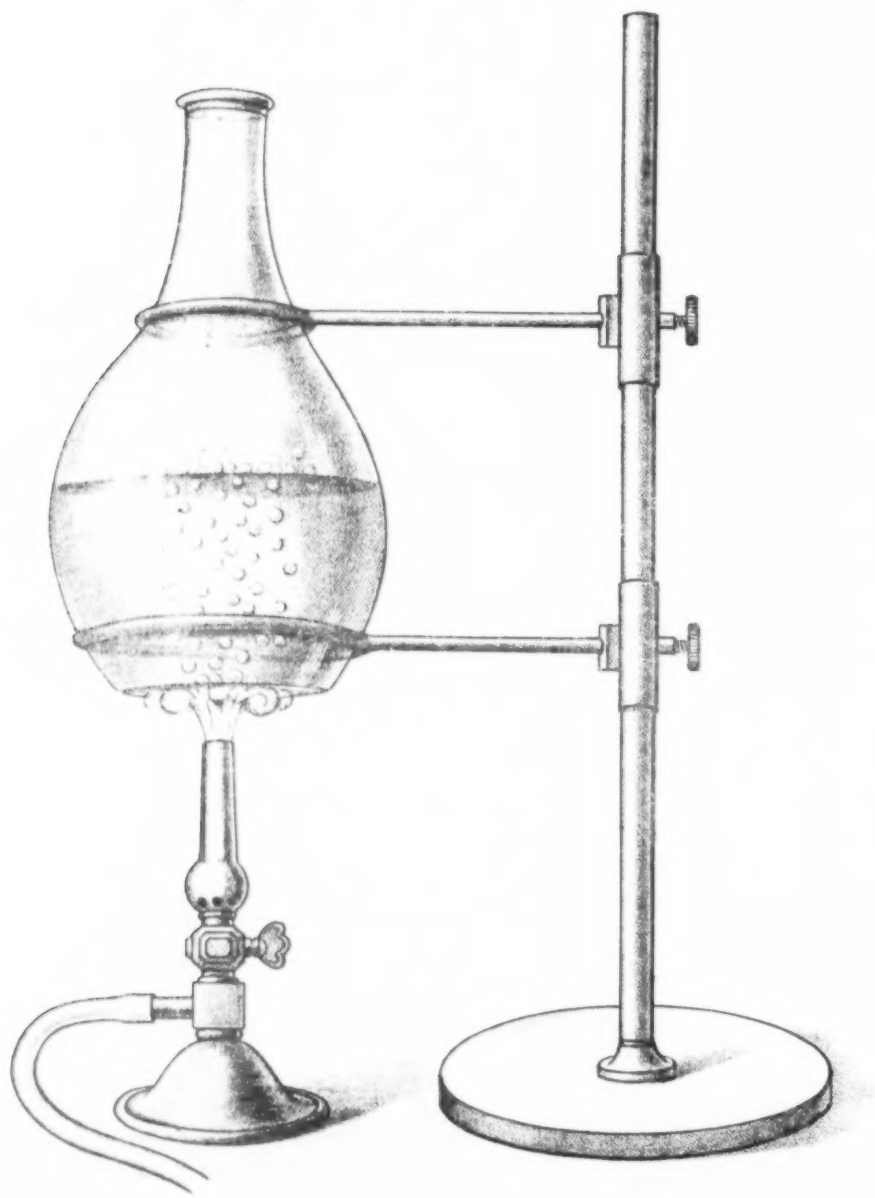

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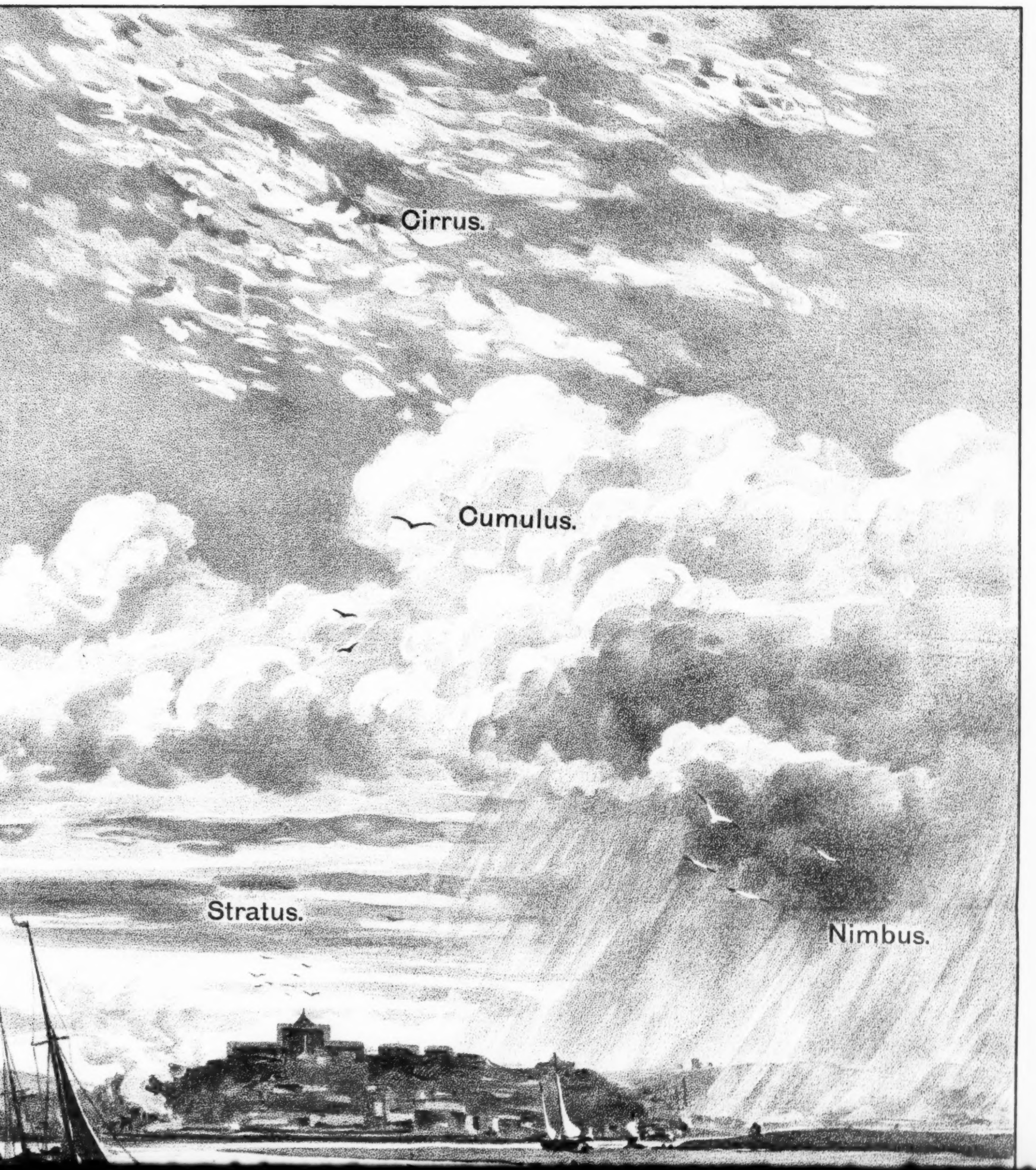

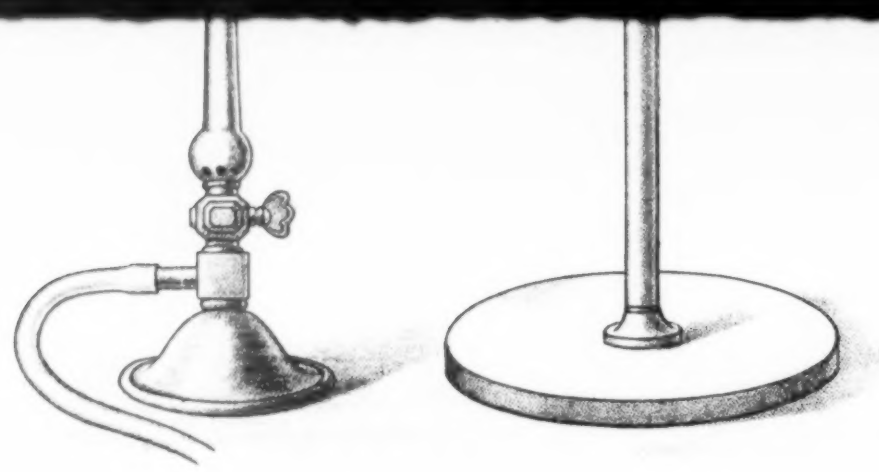

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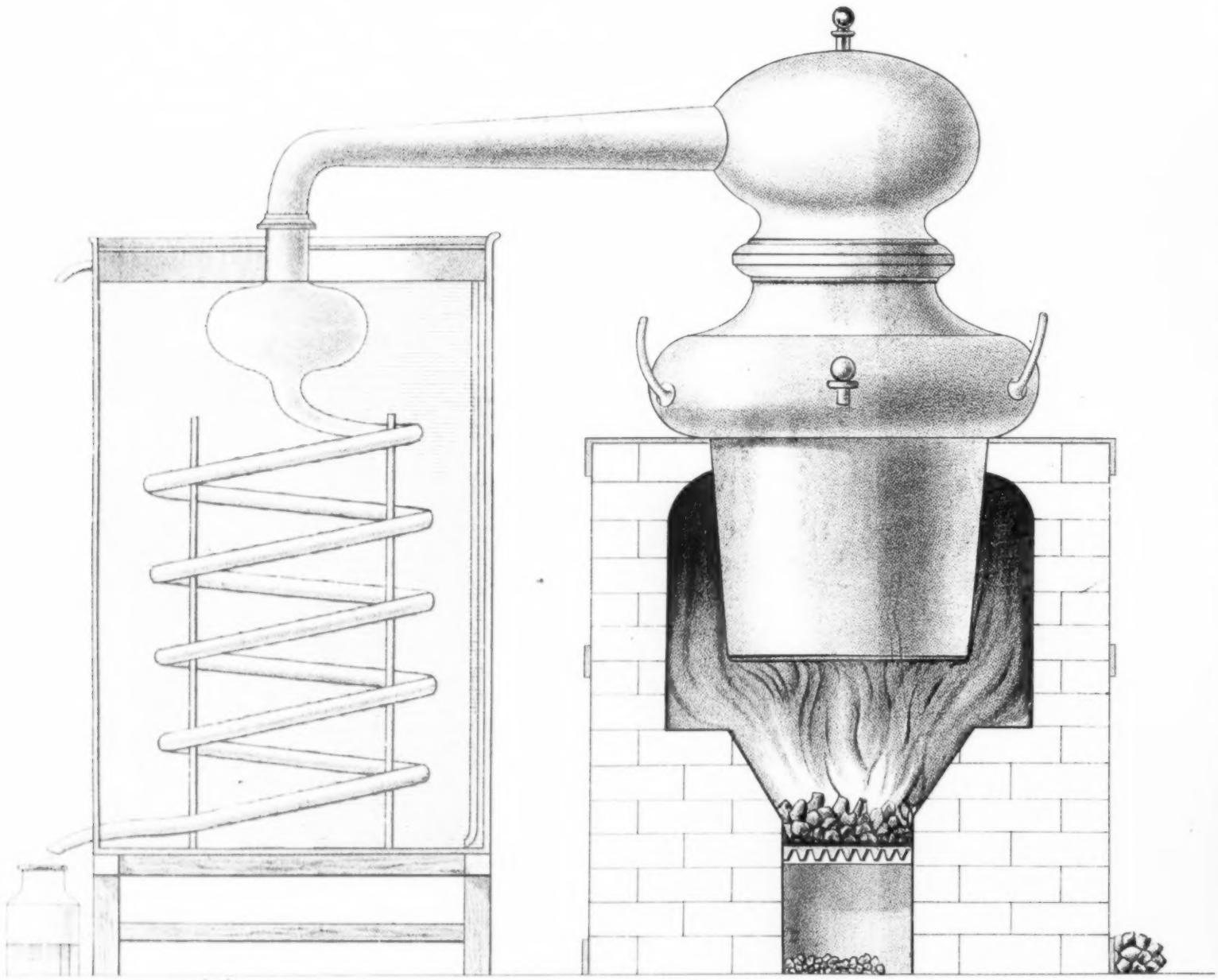

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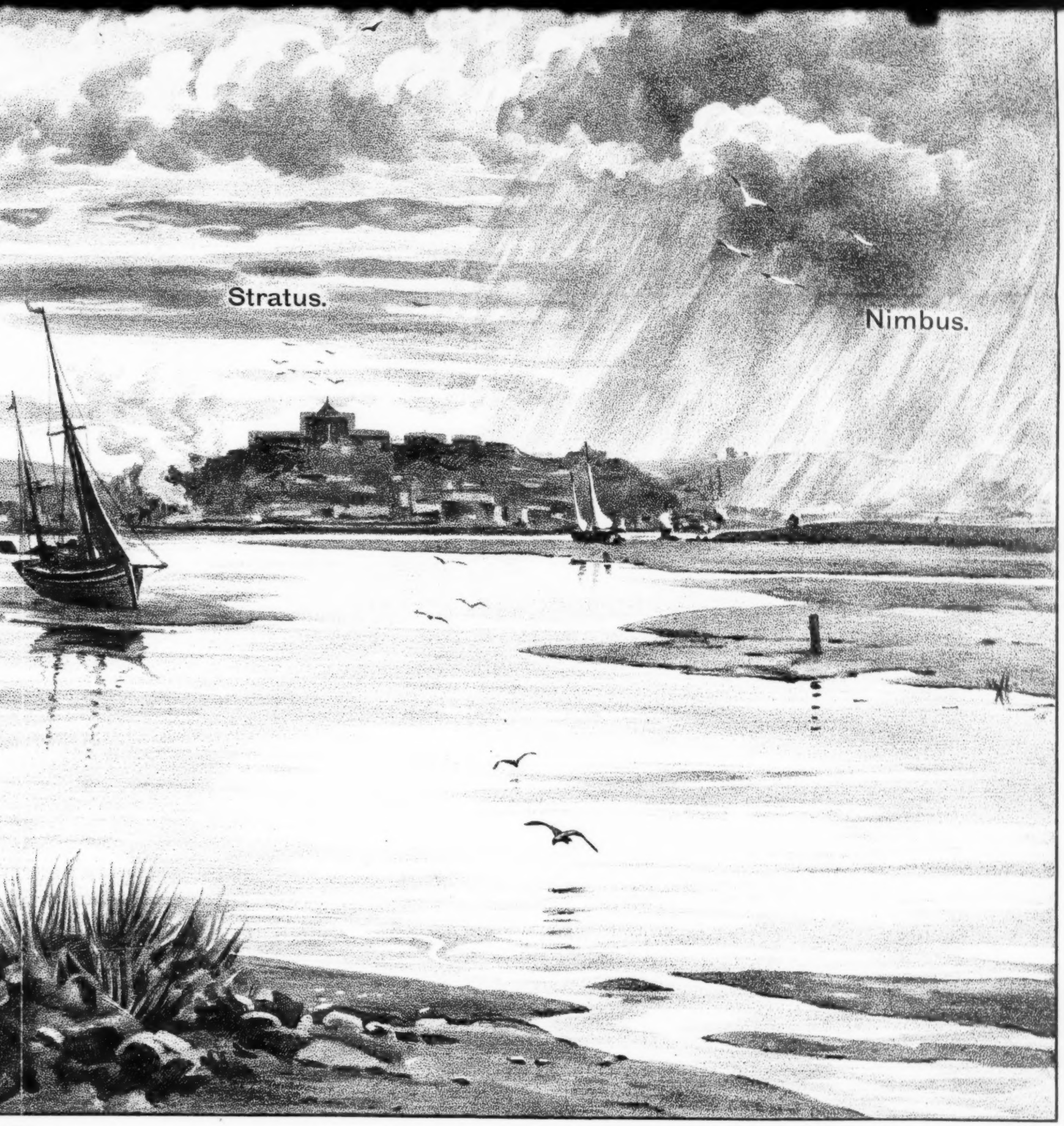

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